Environmental Change, Social Conflicts and Security

in the

Brazilian Amazon:

Exploring the Links

Dr. philos thesis

Department of Political Science - University of Oslo

Submitted by Alexander López

Abstract

Since the discovery of the American continent the Amazon has attracted international attention. The enormous area covered by the basin as well as the limited knowledge about its dynamics have produced through centuries a combination of myths and reality in the exploration of the basin. The stories of *El Dorado* and the *Country of Cinnamon* are starting points in the conceptualisation of the Amazon as an enormous space containing unknown richness and, therefore the origin of the international interest over this region.

Nevertheless the international interest has always been present in the Amazon; it is until the 1980 when a systematic and organised international outcry began to take place. These new sets of international demands focus basically in the process of environmental change occurring in the area. Thus, attention is paid to the rate and extent of deforestation as well as to the national and international implication of such a process. The interesting aspect is that simultaneously to the process of environmental change a large number of social conflicts take place. As a result the Brazilian Amazon started to suffer abrupt changes, not only in its natural dimension, but also in its social one.

Even though during the last three decades environmental change and social conflicts develop in an important magnitude, the academic debate outside Brazil has been centred in the process of environmental change. The social conflict dimension indeed has been marginalised in the analyses done up to now. Moreover, no serious academic attempt has been done in order to link in one given structure of analyses the two most important aspects of contemporary Amazon (environmental change and social conflicts).

It is for the prior reason that the main objective of this dissertation is to overcome this gap by exploring the most important sources of social conflicts in the Brazilian Amazon, studying the particular contribution of environmental change to such a process.

To carry out this objective I divide this dissertation in three parts containing nine chapters. Part A includes chapters I, II, and III. The main aim of this part is to provide with the necessary information of what is this dissertation about, as well as to point out what are the most important academic feeders for this study. Consequently, chapter I it is presented as the introduction in which I explain why this study is being carried out. In addition, it presents the research problem, the research questions, the main propositions, the research area, and the process of data collection.

Chapter II discusses what I call the academic feeders of this dissertation. This is the most important work done in relating environmental matters to security and violent conflict. In particular it evaluates the contributions and limitations of what is called here the *environmental security approach* and the *environmental conflict approach*. This serves as background for the discussion presented in chapter III where I will present most of the research design adopted in this dissertation. Thus, chapter III shows my own theoretical methodological proposal for undertaking this research. Using a systemic perspective I specify a set of four independent variables with possible incidence in the value of the dependent variable (social conflicts). Thus, I place environmental change, land and income distribution, allocation of resources, and population growth as independent variables. However, the term independent does not mean that there is not relation between them, on the contrary it is by

understanding the links among them that one can get a better knowledge of the situation in the Brazilian Amazon.

Part B encompasses chapter IV and V. Chapter IV provides an overview of the most influential historical elements in terms of the research problem. This chapter will explain why facts as the Pombal period, the rubber boom economy and specially the *developmentalism* idea are important elements for understanding the current situation in the Brazilian Amazon.

Chapter V applies the macro perspective to the Brazilian Amazon. It exhibits an analysis of the current system dynamics. The evaluation of such dynamics is done in two levels. First, I present the system-suprasystem interactions (Brazilian Amazon-international community). The links are understood and related to the arguments presented in the environmental security approach (chapter II). The second level focuses on the main internal attributes of the system. This is done in order to facilitate the understanding of the case studies and it is related to the *environmental conflict approach*.

Finally part C encompasses the remaining chapters (VI to IX). This part presents a detailed evaluation of the main sources of social conflicts in Roraima and Pará and the possible contribution of environmental change to the conflict dynamic. At the same time I point out some of the main links between the subsystems (Roraima and Pará), and between them and the Brazilian Amazon (chapters VI and VII). In chapter VIII I use the comparative method in order to evaluate the cases of Roraima and Pará. In order to carry out this task I use partially Mill's methods of difference. This is done basically in order to see the specific contribution of environmental change to the social conflicts taking place in the Brazilian Amazon. At the end this chapter provides the major findings obtained through the case studies. Finally chapter IX relates the empirical findings to the initial discussion on social conflicts and security. In addition, it provides a suggestion for future research based on what has been discussed throughout this study.

Preface

This dissertation is based on research carried out during the years 1994-1998 at the department of Political Science, University of Oslo. A work such as this does not only constitute the author' s effort. Most of all, this work is the result of the assistance, advises, and remarkable help of several people and institutions.

First of all, special thanks to the Norwegian Council of Universities (NUFU) for financial support during the whole research period. Extended thanks to the Institute of Political Science, University of Oslo as well as to the Universidad Nacional de Costa Rica for extra financial support. Without the financial assistance of these institutions the fulfilment of this dissertation would have been almost an impossible enterprise.

For the empirical information I am particular grateful to several Brazilian Institutions. Many thanks to the People at the Comissão Pastoral da Terra (CPT), Conselho Indigenista Missionário (CIMI), as well as the Centro Nacional de Informação Ambiental, IBAMA. Many thanks also to the librarians at the Núcleo de Áltos Estudos Amazônicos (NAEA) and the Instituto Nacional de Pesquisas da Amazônia (INPA), special thanks to Silvia Elena Andrade in INPA for her continuos assistance during my two visits to INPA.

I remain grateful to the hospitality and help provided by Dr. Martin Coy at the Centro de Pesquisa Sobre América Latina, Geographisches Institut, University of Tübingen as well as Dr. Regine Schönemberg at the Pilot programme to conserve the Brazilian Rainforest, Berlín. Many thanks also to Gordon MacMillan for his hospitality and valuable information on Roraima's issues. Thanks also to Karen Hurley for proof-reading, Ingar Bondhus for the final editing of this dissertation, and Liv Karin Andersen for her support.

In the academic development of this work I owe a great debt to my supervisors Professor Helge Hveem and Arild Underdal at the Department of Political Science, University of Oslo. Thanks to them for helping to clarify different parts of this work as well as for providing very useful suggestions. Their patient and constructive criticism has been crucial in carrying out this task during this period of time (1994-2000). To professor Hveem and Underdal my most sincere gratitude.

Alexander López

Heredia, Costa Rica

November, 2000

Table of contents

List of maps, tables, graphs and figures

Maps

Tables

Graphs

Figures

Glossary of words in Portuguese used in the text

Aforamento perpétuo: Lease from the state to forest extraction

Alvará de pesquisa: Mineral research permit

Aviador: Creditor and/or supplier in aviamento system. An intermediary who supplies rural clients with basic production and subsistence goods at the beginning of a season and against eventual payments in kind.

Aviamento: Supply and credit system for extractive activities involving multiple intermediaries and a long chain of debt

Barração: Trading post

Branco: Literally white. However, in Brazil is used to name all non-Amerindians

Cabanagen: Nineteenth-century popular revolt in Pará

Caboclo: Nontribal Amerindians. They typically combine horticulture, extraction, hunting and fishing in varying proportions

Castanhal: Brazil nut grove

Castanheiro: Brazil nut collector

Cerrados: Savannah region of the central Brazilian plateau

Comissário Volante: River trader

Dono de seringal: Owner or leaseholder of rubber tapping area

Dono do garimpo: Owner of mining claim

Fazenda: Ranch

Fazendeiro: Rancher

Foreiro: Leaseholder of aforamento

Garimpagen: Small scale surface mining

Garimpeiro Small scale surface miner:

Garimpo: Small-scale surface mining site

Geleiro: A commercial fisherman using ice in the boat

Grilagem: Land grabbing

Grileiro: landgrabber

Latifundiário: large state owners

Latifundio: Large estate with extensive areas of under-utilised land

Maloca: Indian village or settlement

Manioc: The staple root throughout the tropical lowland of América

Meia-praca: The relationship between share worker and supplier

Minifúndio: Smallholdings

Nova República: name applied to the transitional civilian government established in 1985.

Piraíba: The largest Amazonian catfish

Pirarucú: The largest scaled fish in the Amazon

Pistoleiro: Gunslinger

Posse: Right to usufruct land by acquired occupancy

Posseiro: Settler without legal land title

Seringueiro: Rubber-Tapper

Tambaqui: A fruit-eating fish especially in the Amazon

Terra devoluta: Unoccupied public land

Terra Firme: land not subject to annual inundation. Characterised by rapid nutrient cycles which draw primarily on plant litter rather than on the generally poor soils. The elevation varies from above flood level to several thousand feet.

Tucunaré: A large Amazonian fish

Várzea: The flood plain of a white water river, which receives an annual deposit of fertile silt. It is characterised by highly fertile and friable soils.

List of Acronyms

ALBRAS	Alumínio do Brasil (Aluminium Company of Brazil)
ALUNORTE	Alumínio do Norte (Aluminium Company of the north)
BASA	Banco do Amazônia (Bank of Amazonia)
CEDI	Centro Ecuménico de Documentação e Informacção (Ecumenical Centre for Documentation and information)
CIMI	Conselho Indigenísta Missionário (Indian Missionary Council)
CNBB	Conferência Nacional dos Bispos Brasileiros (National conference of Brazilian Bishops)
CNS	Conselho Nacional dos Seringeiros (National Council of Rubber-Tappers)
CONTAG	Confederacção Nacional dos Trabalhadores na Agricultura (National Confederation of Agricultural Workers)
CPT	Comissão Pastoral da Terra (Pastoral Land Commission)
CSN	Conselho de Segurança Nacional (National Security Council)
CVRD	Companhia Vale do Rio Doce (Rio Doce Valley Company)
DNPM	Departamento Nacional de Pesquisas Minerais (National Mineral Research Department)
ELETROBAS	Centrais Eléctrica do Brasil SA (Brazilian Central Electricity Board)
ELETRONORTE	Centrais Eléctricas do Norte do Brasil (Northern Brazil Electricity Board)
EMBRAPA	Empresa Brasileira de Pesquisa

	Agropecuária (Brazilian Enterprise for Agricultural Research)
FINAM	Fundo de Investimento da Amazonia (Investment Fund for Amazonia)
FUNAI	Fundação Nacional do Indio (National Indian Foundation)
GETAT	Grupo Executivo das Terras do Araguaia-Tocantis (Executive Group for the Lands of the Araguaia-Tocantis)
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Renováveis (Brazilian Institute of the Environment and Renewable Resources)
IBASE	Instituto Brasileiro de Análises Sociais e Econômicos (Brazilian Institute for Social and Economic Analysis)
IBDF	Instituto Brasileiro de Desenvolvimento Florestal (Brazilian Institute of Forestry Development)
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
IDB	Banco Interamericano de Desarrollo (Inter-American Development Bank)
INCRA	Instituto Nacional de Colonizacção e Reforma Agrária (National Institute for Colonisation and Agrarian Reform)
INPA	Instituto Nacional de Pesquisas da Amazônia (National Institute for Amazonian Research)
INPE	Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research)
MIRAD	Ministerio da Reforma e do Desenvolvimento Agrário (Ministry of Agrarian Reform and Rural Development)
MMA	Ministério do Meio Ambiente, dos

	Recursos Hídricos e da Amazônia Legal (Ministry of the Environment, Water Resources and Legal Amazonia)
MST	Movimento dos Trabalhadores Rurais Sem Terra (Landless Rural Workers' Movement)
NAEA	Núcleo de Áltos Estudos Amazônicos (Nucleus of Higher Amazonian Studies)
NGO	Non-Governmental Organisation
PCN	Projeto Calha Norte (Calha Norte Project)
PGC	Programa Grande Carajás (Greater Carajás Programme)
PIN	Programa de Integração Nacional (Plan for National Integration)
PLANAFLORO	Plano Agropecuário e Florestal de Rondônia (Rondônia Agricultural, Forestry and Livestock Plan)
PND	Plan Nacional de Desenvolvimento (National Development Plan)
PNMA	Plano Nacional do Meio Ambiente (National Environmental Programme)
POLAMAZONIA	Programa de Polos Agropecuários Agrominerais da Amazonia (Programme of Agricultural and Agro-Mineral Poles of Amazonia)
POLONOROESTE	Programa de Desenvolvimento Integrado do Noroeste do Brasil (Northwest Brazil Integrated Development Programme)
PROTERRA	Programa de Redistribuição de Terras é Estímulos a Agro-Industria do Norte e Nordeste (Programme of Land Redistribution and Stimuli to Agro-Industry in the North and North-East)
PT	Partido dos Trabalhadores (Workers' party)

RADAM	Radar na Amazônia (Radar in Amazonia)
SAE	Secretaria de Assuntos Estratégicos (Secretariat for strategic Affairs)
SEMA	Secretaria Especial do Meio ambiente (Special Secretariat for the Environment)
SIPAM	Sistema de Protecção da Amazônia (System for the protection of Amazonia)
SIVAM	Servico de Informacção e Vigilância da Amazônia (Information and Surveillance Service for Amazonia)
STR	Sindicato dos Trabalhadores Rurias (Rural Workers' Union)
SUDAM	Superintendência de Desenvolvimento da Amazônia (Superintendency for the Development of Amazonia)
SUFRAMA	Superintendência da Zona Franca de Manaus (Superintendency of the Free Port of Manaus)
UDR	União Democrática Ruralista (Rural Democratic Union)
UNI	União Das Nacões Indigenas (Union of Indigenous Nations)

PART A. METHODOLOGY AND THEORETICAL BACKGROUND FOR THE STUDY OF ENVIRONMENTAL CHANGE, SECURITY AND SOCIAL CONFLICTS IN THE BRAZILIAN AMAZON

Structure of part A

Part A is divided into three chapters. The first two chapters present what this study is about, and discuss the main arguments of the research on the topic carried out by others. These chapters are intended to give a background for the presentation of my own approach in chapter III.

The first chapter of this part exhibits in five short sections the relevance of the present study. Thus, it specifies the research problem and gives a synopsis of the main contributors who have approached the research problem. Moreover, it provides an overview of the research area (Brazilian Amazon), and finally it shows the research methods and describes the process of data collection.

The second chapter of part A discusses in detail the opposing and favourable arguments linking environmental matters to security and the emergence of social conflicts. Basically I concentrate on the studies carried out by the ENCOP and Toronto group when it comes to environmental related conflicts. Finally, the third chapter deals with the use of the system perspective in this study and sketches the framework of analysis to be used for the examination of the empirical data.

CHAPTER I. FRAMING THE RESEARCH PROBLEM

In a sense people are the most endangered species in the Amazon region (Ignacy Sachs).

1.1 Explaining the motives behind this study

Environmental change has emerged as an important issue on the national and international agenda in the last decades. As a result, besides the classical considerations of economic growth and security affairs, the environment as an issue has gained an important space in the literature of international relations. Thus, the Amazon has been taken as an important object of study when it comes to discussing the international and national politics of the environment. Although the Amazon includes seven more countries, the debate is normally focused on the Brazilian Amazon. The above is understandable due to the fact that Brazil occupies most of the Amazon. Thus, as argued by the Worldwatch Institute, Brazil is one of the eight countries with more influence on the international politics of the environment. The other seven are China, India, United States, Germany, Japan, Russia and Indonesia.

The relevance of the future of the Amazon is built to a large extent by the fact of the recognisable interdependence of the ecological system as well as by the widely accepted notion of environmental externalities as a result of environmental change. In that sense, environmental change has emerged as a transborder activity whose effects in many cases are perceived as a threat to the livelihood of the people living in the area. Under certain circumstances it also contributes to the creation of social stress and conflict among the local

inhabitants. The complexity of the research area is reflected in the development of this dissertation, hence its multilevel character (subnational, national, and international level), its interdependent character (ecosystem disturbance versus social conflicts), and its multidisciplinary orientation.

The Amazon has always received international attention (see chapter IV and V). However the current debate came basically as a result of developments after the 1950s. In fact, since the decade of the 1950s the Amazon basin witnessed the emergence of ideas of demographic occupation, economic growth, and security. Examples of the implementations of such ideas are found in *Operation Amazônia*, the National Integration Plan, *Polamazonia*, *Polonoroeste*, and *Calha Norte*.[1] As a result of the above conceptions the Brazilian Amazon experienced two different phenomena. On one hand the Amazon became a very violent area, where social conflicts broke out all over. On the other hand, an acute phenomenon of environmental disruption took place, deforestation being its most visible manifestation of it.

In summary, the importance of the Brazilian Amazon as an object of study within the international politics of the environment, the complexity of the object of study due to its multilevel and interdependent character and, most importantly the need to integrate in one analytical framework the two most important phenomena of contemporary Amazon (environmental change and social conflicts) have been the driving motives for undertaking this study.

1.2 The research problem

The environmental transformation in the research area brought about at the end of the 1980s caused widespread discussion about the way the Amazon basin should be managed, and consequently about the future of the Amazon. In this respect, we have recently observed the emergence of a new thinking. It argues that the Amazon basin requires another approach to management, where the vast natural resources should be harnessed for the benefit of Brazilian society and the world as a whole. The above has produced a great debate around the so-called internationalisation of the Brazilian Amazon. One of the outcomes of the debate seems to be the adoption by the Brazilian authorities of some "*extra*" measures to assure sovereignty over the Amazon. One result is the current discussion on the militarisation of the Amazonian environment. It is my consideration that the preoccupation with conservation and sovereignty has led to the neglect of the other face of the coin, social conflicts. It is my opinion that most analyses of the Brazilian Amazon have been too "*green*", paying attention basically to the problem of deforestation, whereas the other essential aspect of contemporary Amazon (social conflicts) has been to a certain extent underestimated in the analyses done up to now. As previously mentioned, it is that preoccupation for integrating the two more prominent factors of the current situation in the Brazilian Amazon (environmental change and social conflicts) that has motivated me in undertaking this study.

Consequently, this dissertation seeks to take a closer look at some of the sources of social conflicts in the basin. A set of four independent variables has been selected in order to explain

1 It does not mean that before 1950 no change occurred in the Brazilian Amazon. In fact, since the conquest of this vast territory by the Portuguese the basin experienced several attempts to occupy and exploit its resources. Thus, first was the exploitation of spices, followed later by the production of cotton and rice. Finally, at the end of last century and the beginning of this century the exploitation of rubber was the motor of the economic occupation of the territory. In the same way the ideas of security were present since the colonisation, being at the beginning the main goal to keep other imperial powers away from the Amazon. Later the strategy of Pombal represented a security conception to occupy and develop the Amazon. In conclusion, the ideas of economic growth, occupation, and security are not new, what is new is the scale of the implementation of these ideas.

the social conflicts in the Brazilian Amazon: allocation of resources, distribution of land, environmental change, and population growth. However, special attention is paid to environmental change. As a result the two main questions of this dissertation are the following:

1) *Which are the main sources leading social actors to engage in a situation of manifest conflict in the Brazilian Amazon?*
2) *To what extent does environmental change (as a source) contribute to social conflict in the Brazilian Amazon?*

1.3 Beyond mechanism and determinism: The required systemic perspective

As I have previously mentioned, my main motivation in undertaking this study has been the lack of an integrative analysis of the two most important factors of contemporary Amazon. In the case of the Amazon there is extensive literature, nevertheless much of it is based on what Fritjof Capra (1982) calls "mechanistic parading". In this view things are seen as objects formed by parts. This is exactly what has happened with the analysis of the Amazon. The basin has been taken as an object of study in a mechanistic way, analysing its parts and processes in isolation. What I am proposing here is a shift from *object* to *relationships*. This means that the social and natural processes manifesting themselves in the basin as well as the subnational, national and international level are not separate worlds, but they are essentially interrelated processes determining the condition of the entire basin.

Very few analyses on the Amazon have tried to integrate natural and social factors, and even fewer have placed the discussion in a systemic perspective. In addition, no study has explored in clear methodological ways the links between environmental change and social conflicts in the Brazilian Amazon. Thus, what has been missing is the building of a bridge between the process of ecosystem disturbance and the process of social conflict.

When it comes to literature on the Brazilian Amazon Andrew Hurrell (1991, 1992, 1993) stands out as the main contributor from an international relations perspective in developing a national-international analysis as well as in relating different sectors (socio-economic to environmental one). On a general level, Hurrell (1993) has argued that the impact of environmental matters on international affairs has been important. The reason is found in the conflictive relation between the ecological interdependence and the independence and fragmentation of the international system (Hurrell, 1993: p.25).[2]

Hurrell's work on the Amazon is, above all, related to deforestation where he explores the role of the international community and the Brazilian response. In an important article entitled *"The International Politics of Amazonian Deforestation"* he reports an analysis of the Brazilian attitudes toward the Amazon from an international relations perspective. Thus, he mentions three international factors critical in understanding such a situation. First, the emergence of a transnational coalition of pressure groups. Second, the successful imposition of external pressure on Brazil, and finally, the growing awareness in the Brazilian government that environmental issues could provide new international opportunities and a new, if problematic, source of potential leverage (Hurrell, 1991: pp.398-399).

Moreover, the interrelation of the national-international level can also be noted when analysing the causes of deforestation in the Brazilian Amazon. Thus, Hurrell recognises the complexity of the sources. Hurrell argues that environmental problems break down the

2 Based on my own translation. The text is found in the book *Medio Ambiente y Relaciones Internacionales*. Ernesto Guhl & Juan G. Tokatlian eds.; Tercer Mundo Editores. 1993.

distinctions between the domestic and international spheres. Finally, his conclusions also reflect the criteria formulated here. For instance, Hurrell argues "international action played an important role in altering Brazilian attitudes and policies toward the region" (Hurrell, 1992: p.427). Moreover he adds, "calculation of advantage will not be limited to a deforestation regime, nor even to an international agreement on global climate change, but will depend crucially on trade-offs and linkages between the environment and the many other issues of Brazil's foreign and domestic political agenda" (Hurrell, 1992: p.428).

Hurrell's analysis is an important contribution in terms of presenting an international perspective on the deforestation problem in the Amazon. However, he pays attention just to one aspect of environmental change (deforestation). Moreover, he does not deal with the dynamics of social conflicts in the basin and the role of environmental change in causing social conflicts.

The ecologist Philip Fearnside (1984, 1987, 1990, 1997, 1998) is the researcher who has explored in a most systemic way from a natural science perspective the implications of environmental change on social processes. He has been writing extensively on the Amazon, basically on aspects related to deforestation. I shall not present his arguments in detail here because they will be demonstrated through the development of this dissertation (see chapter V). Nevertheless, at a general level it should be said that some of his work, above all the one focusing on deforestation, global warming, and environmental services, has examined the consequences of environmental change on social processes as well as the national-international connections. For example, he has often made references to the role of the international community as an agent that can prevent or accelerate deforestation. In a recent paper he pointed out that "Industrialised countries contribute most of their funds loaned by the World Bank and the Interamerican Development Bank, and consequently these countries have the most to say in how the money is used. The multilateral development banks are a major force in Amazonian development, and can have a great effect for good or for evil, depending on the policies under which they operate" (Fearnside, 1998: p.12).

A pioneer in linking environmental change to violent conflict is Thomas Homer-Dixon (1991, 1994,1996).[3] Even though he has not carried out any work in the Amazon basin, he and his colleagues have conducted several case studies around the world examining the particular contribution of environmental scarcity in generating violent conflicts. However, his work remains very much at a subnational level, and does not examine the relationship between the subnational-national and international level. In addition, one may see a certain degree of environmental determinism in the fact that he places environmental scarcity as the core independent variable without measuring the particular contribution of other independent variables. This is not to say that Homer-Dixon did not consider other variables. However, he works with several intervening variables instead of independent ones.

In this dissertation I avoid analysing the Brazilian Amazon in terms of a strict cause-effect perspective. Hence my aim is to explore how in an open system (as the Brazilian Amazon) the relationship can be indirect. In addition, I am aware that the relationship in the Brazilian

3 Most of the theoretical and empirical work on the links between environmental scarcity and/ or change and security and/ or conflicts has been done in the following institutes: Peace and Conflict Studies Program at the University of Toronto. This Institute has conducted two studies under the leadership of Thomas H. Dixon. They are the projects on Environment Population and Security and the project on Environmental Scarcities, State Capacities and Civil Violence. A second institution is the Centre for Security Studies and Conflict Research in Zurich. They produced some work under the Environment and Conflict Project (ENCOP). Finally, two other institutions involved in research on this area are: the Peace Research Institute in Oslo and the Environmental Change and Security Project at the Woodrow Wilson Centre, Washington.

Amazon can work in both ways, that is for example that environmental change can lead under certain circumstances to social conflicts, but social conflicts as well can be a source of environmental change. However, the primary interest in the present study is to explore the first type of connection.

In conclusion, it can be argued that from the international relations perspective there is no major contribution capturing the complexity involved in the relationship between the two factors that I argue are the most relevant ones in contemporary Amazon: environmental change and social conflicts. In addition, it is my impression that the case studies done in other parts of the world linking environmental change to social conflicts have lacked a systemic view. Thus, in most of the case studies done the potential links between environmental change and social conflicts are perceived as an isolated study-object. This means that the influxes running from the suprasystem to the system and viceversa have been often forgotten.

1.4 Research area

The area in which the study of this dissertation has been conducted is the Brazilian Amazon. The Amazon and its affluents represent the greatest river system on earth. About one fifth of all fresh water transported by rivers to the oceans passes through the Amazon River. The Brazilian Amazon extends over almost 5 million square kilometres, around 55 % of Brazil's total landmass. It contains about a third of the Earth's remaining tropical forest and a very large portion of its biological diversity. The Amazon is also home to an outstanding cultural diversity: indigenous groups, peasant communities, *caboclos*, miners, forest dwellers, etc. However, the Amazon is not what many people think it is. The Brazilian Amazon is not flat, nor is it entirely covered by rainforest. Many areas of the Brazilian Amazon are covered by grassland (*campo*), upland savannah (*cerrado*), and annually flooded wetlands (*várzea*).[4] In addition, most of the population living in the basin is not rural, but urban.

In relation to the selected research area it is important to clarify two aspects: first, aside from Brazil the Amazon basin encompasses seven more countries, they are: Bolivia, Perú, Colombia, Venezuela, Ecuador, Suriname and Guyana (see map No. 1). Second, the Brazilian Amazon is defined in two different ways: The *classic Amazon* that is the region linked to the basin. This includes the states of Amapá, Pará, Roraima, Rondônia, Amazonas, and Acre. The second concept is the *legal Amazon*, which is a division made by the government for administrative purposes. The *legal Amazon* includes all the states of the *classic Amazon* plus parts of the states of Mato Grosso (north of the parallel 16o), Maranhão (west of the meridian 44o), and Tocantins (north of the parallel 13o) (see map No.2). In this dissertation I will basically work with the Amazon linked to the basin. However, there will be some cases in which I will refer to the legal Amazon. In both cases the Brazilian Amazon to which I am referring to will be specified.

As I said, the research area is the Brazilian Amazon, however with the aim to gain insight into the research problem I will work with two case studies, the Amazonian states of Roraima and Pará. Roraima and Pará have been chosen for in-depth analysis for two reasons. First, taking into account that this study attempts to use a systemic perspective, it is imperative to study the system (the Amazon basin) by its constituent parts (Roraima and Pará). Thus, the case studies are of great relevance not only because they provide more detailed empirical information, but mainly because through them one could determine differences and similarities between Roraima and Pará and between these states and the Brazilian Amazon as a whole. The second reason and the one explaining why these states and not others have been

4 Approximately 60 % of the Brazilian Amazon is covered by tropical rainforest. Grassland and savannahs occupy another 35 percent. Finally, a very small area is composed of flooded wetlands.

selected is the fact that they vary significantly in terms of the dependent variable. Many of the previous analyses carried out in the form of case studies have been criticised for lack of variation in the dependent variable. In this study it will be noted how the number of cases of open conflicts in Pará and Roraima present substantial differences. Thus, it is important to understand these variations when relating them to the variable environmental change. The above can tell us something about the connection between environmental change and social conflicts in the Brazilian Amazon.

Previous research made in the region has demonstrated the importance of the Amazon basin in terms of biodiversity, food security for local population, hydrology, water balance, and global climate stability. All the above circumstances have made the Amazon basin a significant object of study, not only at the local level, but also at a national and an international level. I would argue that the preservation of the environmental functions in the Amazon basin is of paramount importance, not simply in terms of maintaining natural capital species for future uses, but also to provide benefits in a more equitable way to the marginal groups living in the region as well as to minimise the social conflicts resulting from the side-effects of environmental change.

1.5 Research methods and data collection

Concerning the research questions information will be provided in a descriptive nature and analysed on a systemic basis.

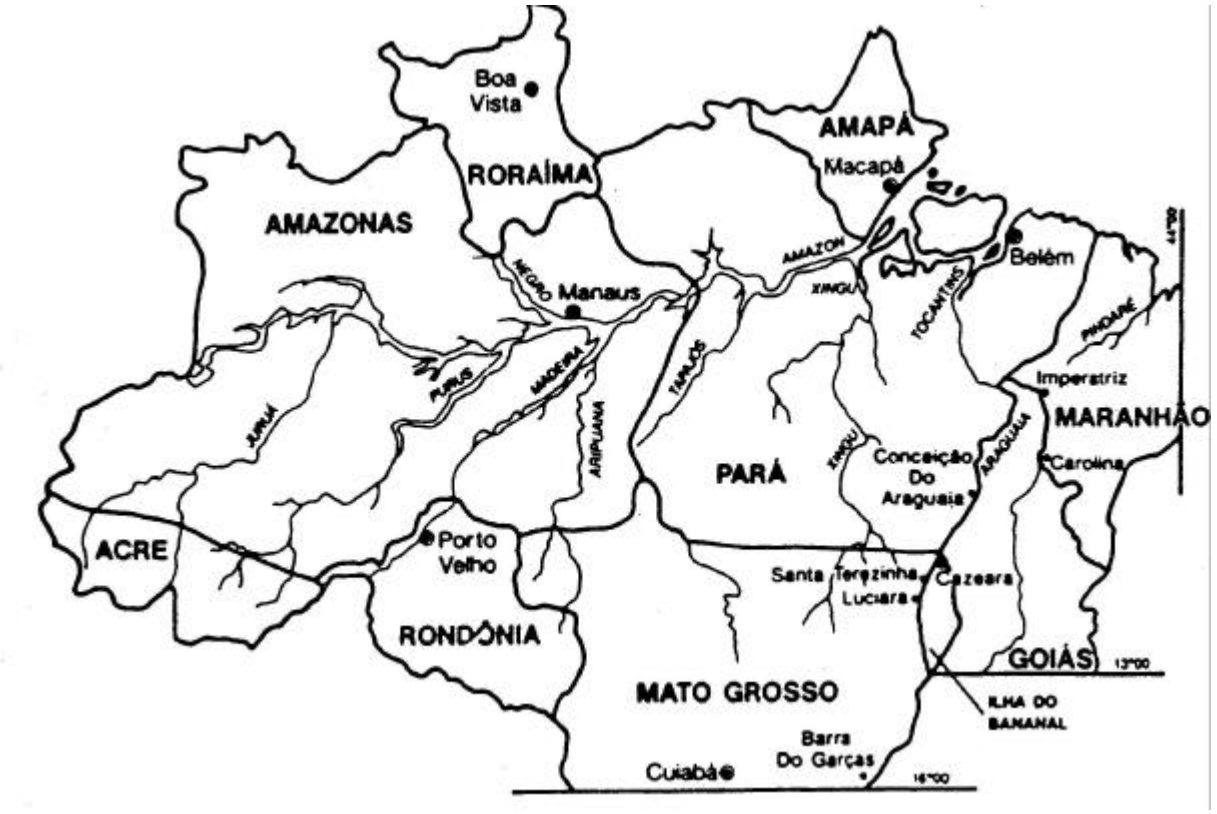
The detailed analyses of the case studies are based on:

1. Direct observation (research conducted where the variables are operating).
2. Analysis of secondary sources and data from interviews.
3. Critical examination of the evidence from the research area (meaning of the information).
4. Division of the research area in two case studies (linkages between case studies and the whole research area).

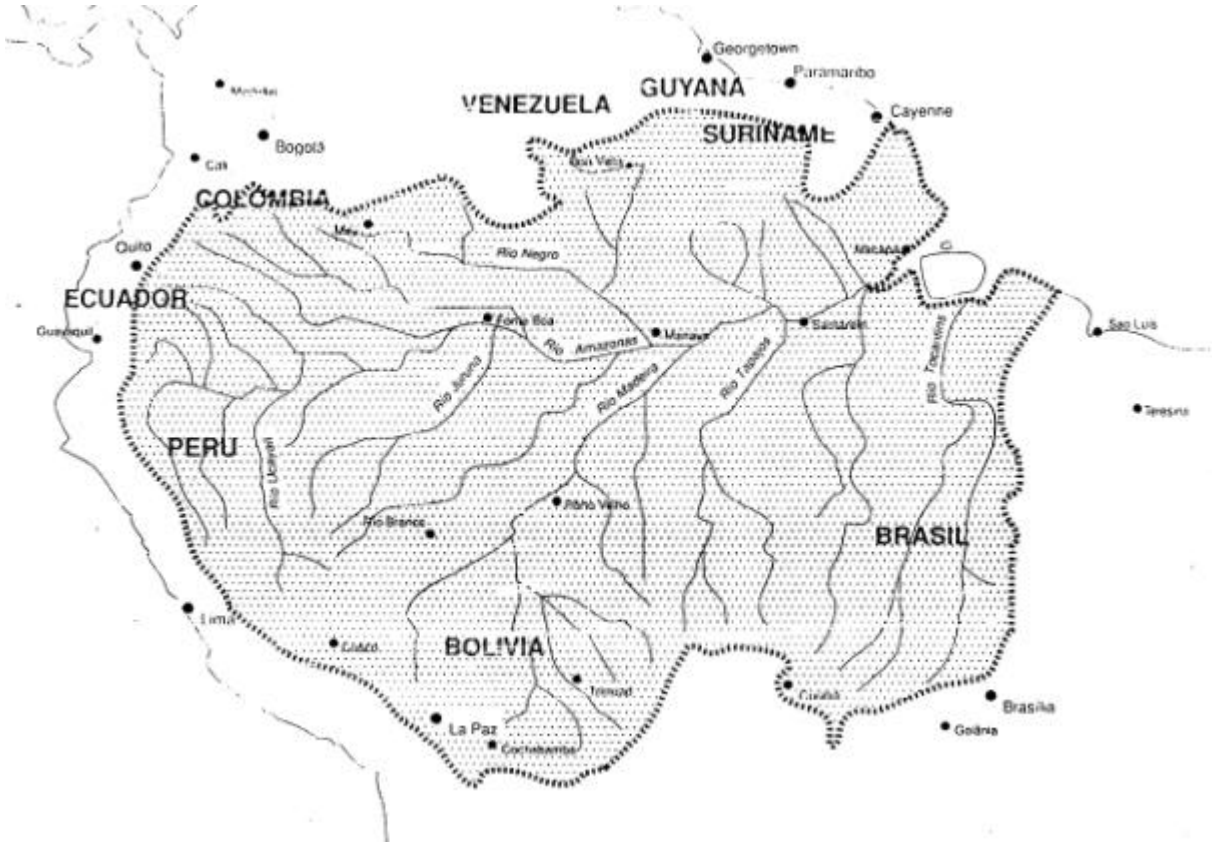
To gather more precise information fieldwork was carried out on two separate occasions at the research area; first in 1995 and again in 1996. Both visits included direct observations in the area under study (e.g. deforestation alongside the main roads), as well several interviews were carried out with researchers and members of governmental bodies dealing with the management of the Brazilian Amazon. In addition, several visits to research institutes both inside and outside of the region were carried out.[5]

5 The main institutions visited were: The National Institute for Research in the Amazon (INPA), Manaus, Amazonas; The Nucleus for Higher Amazonian Studies (NAEA), Belém, Pará; Centro Nacional de Informação Ambiental in Brasilia; Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováves (IBAMA) in Brasilia and Roraima; Secretaria de Asuntos Estratégicos in Brasilia; United Nation Development Program, Country office in Brasilia; University of São Paulo and the Instituto Sociedade, População e Natureza in Brasilia. Additional information was collected in several institutes in Europe, among them: Centro de Pesquisa sobre América Latina, University of Tübingen, Germany; Iberoamerican Institute, Berlin, Germany; Institute of Latin American Studies, University of London, and the Institute of Latin American Studies, University of Glasgow.

Map 1: Amazon countries



<Map 2: Legal Amazon



CHAPTER II. EVALUATING THE ENVIRONMENTAL SECURITY AND ENVIRONMETAL CONFLICT APPROACH

"…environmental degradation imperils nations' most fundamental aspect of security by undermining the natural support systems on which all of human activity depends" (Renner, 1989).

2.1 Introduction

This chapter is divided into two broad parts. The first part focuses on the links between environment and security, and the second on the relationship between environment and conflict. In the first part (sections 2.2, 2.3 and 2.4) I attempt to discuss some of the main questions rising from the current literature linking security studies to the environment. Those questions are basically the following: First, I will try to explain how the environmental security argument has been constructed. Here most attention is placed on the historical evolution of the security discourse, that is to say from the "narrow" perspective to the "wide" perspective. Second, I attempt to explain *what are the main implications of a re-definition of security?* Factors to be evaluated are the conceptualisation of threats and referent objects. Third, I present the main argument against linking security to the environment. Thus, the question is *what are the main problems in adopting an environmental security framework?* The last section of this chapter tries to clarify the question of *when can one speak of an environmental issue as one of security?* All these questions are of great relevance for understanding the link between security and the environment, and to determine to what extent the environment has been securitised in the Brazilian Amazon.

The second part of this chapter explains the nature of environmental related conflicts by presenting part of the research carried out in the field (section 2.5, 2.6 and 2.7). These sections provide some of the preliminary elements which will be used in the analysis of environmental related conflicts in the Brazilian Amazon. In addition, some of the main criticisms of what is called here the Toronto model are presented (section 2.8). It should be said that most of the research in the field has been done in the form of case studies, exploring the particular contribution of scarcity as a generating factor of conflicts, not only at national level but also mainly at subnational level. So far the two research teams that stand out as the main contributors, are the group at the University of Toronto under the leadership of Thomas Homer-Dixon, and the ENCOP group directed by Günter Bächer and Kurt Spillmann at the Swiss Federal Institute of Technology with the environment and conflict project (ENCOP).

The last section (2.9) summarises the main conclusions of the discussion presented in this chapter. It is important to observe that not much empirical reference to the Brazilian Amazon will be provided here, because the arguments presented in this chapter will be used for the analysis in the following chapters.

2.2 Understanding the evolution of the security discourse

The "narrow" perspective

Security has through history been a core concept in the studies of International Relations. Debates about security have traditionally been understood in terms of state security. The history of the traditional concept of security is linked to the modern international system. For that

reason traditional security has been based on the concept of the sovereign state, which was born in the seventeenth century as a result of the emergence in Europe of the modern state (Westphalian order). Hence, the maintenance of sovereignty has been a major element of national security.[6]

In addition, one could argue that the concept of security has been shaped by a state centric-military approach. Therefore, when the concept of security has been used it has been linked above all to *national* security. The above is due to the fact that the study of international security has mostly been the domain of the realist school. It sees the nation-state as the centrepiece of the international system. Traditional approaches to national security have assumed that the principal sources of danger were other states. In that sense, some scholars have equated security with the perceived power of the state to defend itself from external attack.[7]

Based on the above perspective national security generally refers to the security of a state and/or nation from being attacked by a potential enemy.[8] As a result the military tools were the main elements building the power of the state. Thus, organised violence has been the prerogative of the nation-state, being both a domestic monopoly and (in Clausewitzian terms) a tool of foreign policy. In this "realist" conception of security power was a central concept and more importantly the monopoly of power was supposed to lie with the state.

Due to the aforementioned arguments the principal difficulty for some scholar in discussing environmental security has been the recalcitrance of the traditional political-military definition of security (Dyer, 1997: p.23). As Buzan (1991) shows, military threats still retain a theoretical primacy in security thinking, and so long as the international political system is anarchically structured, they will remain of vital interest and importance. However, Buzan (1991) continues by observing that in practice, and especially for the most developed states in the system, the relevance of military threats is declining compared to threats in other sectors (Buzan, 1991: p.133). In addition, as pointed out by Renner (1995), the emerging issues of the post-cold war era point to a different meaning of security that is much closer to people's tangible concerns (Renner, 1996: p.18). Buzan's and Renner's statements are important examples of the need for a wider conceptualisation of security.

The "wide" perspective

In the last two decades several scholars have been working on the idea of redefining the concept of security. Among the most important works are: Brown (1977), Ullman (1983), Mathew (1989), Renner (1989, 1996), Buzan (1991), Lodgaard (1992), Buzan, Wæver and de

[6] The concept of sovereignty has been used by governments to legitimise all actions taken in apparent defence of the nation-state. Consequently, classical definitions of security are closely tied to a state's defence of sovereign interests by military means.

[7] The elements of the centric-military approach can be seen in the features of the national security paradigm during the post-war period. According to Elizabeth Kirk (1991) after World War II the national security revolved around the following:
1. Protection of national territories from outside attack
2. Defending against the expanded influence of ideological enemies
3. Development of alliances and foreign-aid structures based on the East-West power balance.
4. The use of weapons, large armies, global military presence, and security assistance as tools of foreign policy

[8] Westing, Arthur (ed.) "Global Resources and International Conflict" 1986, p.192.

Wilde (1998).[9] The main argument of the proponents of a redefinition of security has been that non-military threats are an important element of insecurity in today's world. Most of the work pays great attention to the environmental sector. Hence, for some of them the negative side effects (externalities) of environmental change constitute a new type of threats. For those supporting this idea, the deterioration of a country's natural resource base, which at the same time undermines productivity capacity, is an example of non-military dangers which jeopardise human well-being (Ulrich, 1989: p.2).

The challenging of the traditional security paradigm (narrow perspective) by using the environmental sector has as one of its main outcomes the emergence of the environmental security concept. For instance, Sverre Lodgaard (1992) points out that environmental security should be defined according to the ideas of: sustainable development of resources, environmental protection in the traditional narrow sense of the term, meaning clear water and air, unpolluted soil etc, and finally minimisation of risk. In the same line of argumentation Jessica Mathews defines environmental security "... as the set of polarities that goes between human activities and the life-sustaining capacities of the earth" (Mathews, 1989: p.391). Buzan states that environmental security concerns the maintenance of the local and the planetary biosphere as the essential support system on which all other human enterprises depend (Buzan, 1991: pp.19-20). In conclusion, most of these attempts to challenge the concept of security and introduce the environment into the analysis are shaped by the following ideas:

a) An attempt to go beyond the traditional paradigm of national security, the analyses being formulated at several levels (subnational, national and international).
b) An effort to stress the participation of new actors with potentially great influence on the national and international agenda, such as intergovernmental organisations, non-governmental organisations, social groups, and public opinion.
c) The assumption of the existence of new referent objects, beside the nation-state
d) The recognition of new types of threats, not just the military
e) The idea that the classical notion of political boundaries could be replaced by the idea of ecological unity.
f) There is also an attempt to redefine the links between economic development, environmental quality, and social needs.
g) Finally, the classical notions of sovereignty and national interest are reformulated and it is argued that they must be supplemented by one of ecological interdependence (reciprocity) and common interest (joint management).

On new threats and referent objects

Taking into account the above seven elements I argue that the current discussion on environment and security is articulated as an attempt to enlarge *horizontally* as well as *vertically* the concept of security. The horizontal expansion emphasises that the threats are no only military in mature. For instance, according to this position environmental degradation and/or resource scarcity may contribute to political instability. Thus, in the environmental sectors two types of threats are considered: First, threats to human civilisation from the

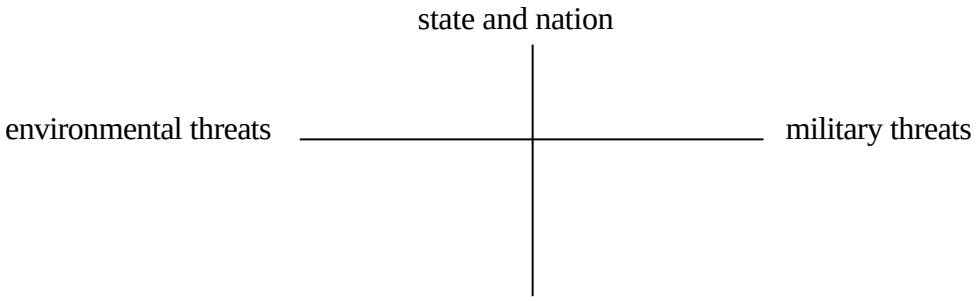
[9] Since 1983 Buzan and Ullman started to consider the problems associated to the narrow perspective. Thus, Buzan stated that the concept of security binds together individuals, the state, and the international system so closely that it demands to be treated in a holistic way (Buzan, 1983: p.245). The same year Ullman (1983) pointed out the drastic deterioration of environmental quality, caused by sources from both within and outside the state, as a threat to national security.

natural environment that can or cannot be caused by human activity. Second, threats from human activity to the natural systems. Therefore, some of the main differences between traditional military threats and the new environmental threats are the following:

a) Many environmental threats are regional and global in scope, and are long term and transboundary in terms of impact, whereas military threats are conceptualised in terms of state versus state, and mostly in the short term.
b) Environmental threats to security threaten the individual and the society as much as the state itself, whereas traditional security is concerned primarily with the state.[10]
c) Military threats are more easily identified in terms of their origin. In contrast environmental threats are basically systemic in origin. This means that they are caused by a complex process, not always by the act of an identifiable actor.

The vertical expansion refers to the situation in which it is assumed that it is not only the state that feels insecure. Hence, the state is not the only referent object, today a much wider spectrum exists. Referent objects are things that are seen to be existentially threatened and that have a legitimate claim to survival (Buzan, Wæver & de Wilde: 1998, p.36). The referent object will depend on the sector with which the analyst is dealing. Following the characterisation developed by Buzan, Wæver & de Wilde (1998) of the environmental sector, two different referent objects are presented: the environment itself and the nexus of civilisation and the environment.[11] The above discussion is represented in figure No.1. Here I use two sectors to explain the expansion: the traditional military sector and the environmental sector.

Figure 1 Horizontal and vertical expansion of the security concept



[10] Some references focusing on arguments over the differences between traditional security and environmental security are available in: Daniel Deudney "The Case Against Linking Environmental Degradation and National Security. " *Millennium*. Vol. 19, 1990. Ian Rowlands "The Security Challenges of Global Environmental Change." *The Washington Quarterly*. Winter. 1991. Paul Sansom. "Environmental Security in the Post-Cold War Arctic. " Draft prepared for the conference *Military Development and Socio-Cultural Change in the Arctic*. 1993.

[11] What is called he nexus of civilisation and the environment here refers to that in many environmental debates the concern is not just for the environment as such, but also for the preservation of an / the existing level of civilisation. In the view explained by Buzan, Wæver and de Wilde (1998), the ultimate referent object of environmental security is the risk of losing the achieved level of civilisation. In all cases the concern is whether the ecosystems that are crucial to preserve the achieved level of civilisation are sustainable.

Summary of the argumentation

To conclude this section it should be said that security under the realist paradigm presents threats coming from an external enemy. Besides, the referent object of security is basically the state itself. Power is understood as a sum of social, economic and military sources. Therefore, state and power are seen as the sum of several factors, and defence is conceived above all by military means. However, as I have shown there are reasons to think that a definition of security under the above parameters is a bit problematic. Threats are not only coming from an external enemy; internal environmental problems threaten the economic stability of a country as well.[12] Threats to security today could come from within nations, not necessarily from invading armies. In addition, the state seems no longer to be the only referent object of security. The referent object will vary greatly across different sectors (the environmental, the economic, the military and the political). Thus, it is not only states that can experience an existential threat, but social groups, firms, and even the biosphere could be a new referent object. Furthermore, power is increasingly measured not only in terms of the aggregation of resources, but also in terms of the ability to mitigate the factors and forces which cause insecurity.

Despite the above arguments, one should be cautious about thinking that the concept of security has a meaning independent of the state. The emergence of other important agents does not imply the eclipse of the state system. What has changed is that the scope of action of the state has been severely constricted, and that now, more than ever, there is a clear interplay between the national, subnational and international level. One main reason is the emergence of new issue-areas such as the environmental sphere, where the state itself is limited in its capacity to generate the outcomes necessary to solve the problems, because environmental problems normally go beyond the state border.

2.3 Arguments *against* redefining security by introducing the environmental variable

This section attempts to answer the question of *what are the main objections to the idea of relating security issues to the environment?* Even though several authors have claimed that war over natural resources is likely to occur, among them Galtung (1982), Lodgaard (1992), Holts (1989), and Lonergan (1997),[13] other scholars such as Deudney and Levy have expressed scepticism about relating environmental issues to traditional national security

[12] There are some environmental problems that can be called national in terms of its formal manifestation in one specific region. However, I am aware of the strong global links of most of the environmental problems. So, I support the thesis that the borders are becoming increasingly porous in terms of environmental threats.

[13] Galtung has argued that destruction of the environment may lead to more wars over resources. Loodgard has said that where there is environmental degradation, or acute scarcity of vital resources, war may follow. The former Norwegian Defence Minister Johan Jørgen Holst has manifested that environmental stress seems likely to become an increasingly potent contributing factor of major conflicts between nations. Finally, the Secretary General of the Habitat Conference in 1996 said that scarcity of water resources is replacing oil as a flashpoint for conflicts between nations. (Arguments cited by Nils P. Gleditsch, 1998: p.382).

interests.[14] Levy (1995) argues that environmental degradation is unlikely on its own to be a major cause of armed conflicts. Deudney's argument is that the traditional focus of national security (interstate violence) has little in common with environmental problems (Deudney, 1992: p.174). He develops four basic propositions to defend his thesis. He points out that environmental degradation and violence are very different types of threats. Both may kill people and may reduce human well-being, but not all threats to life and property are threats to security. Second, the scope and source of threats to environmental well-being and national security respectively are different. There is nothing about the problem of environmental degradation that is particularly national. Third, there is a difference between environmental well-being and national security concerning different degrees of intention involved. Threats of violence involve a high degree of intentional behaviour. Environmental degradation on the other hand, is largely unintentional. Fourth, organisations that provide protection from violence differ greatly from those in environmental protection (Deudney, 1992: pp.174-175). The basic problem with the above critiques is that they are very much based on the maintenance of the state as the only referent object.

Another objection has been formulated in terms of maintaining the concept of security in a narrow sense in order to protect it as an analytical tool. Stern (1995) calls this the orthodox view. For instance Walt (1991) notes that attempts by some scholars to incorporate non-military phenomena into the security concept will expand the concept excessively. Thus, he claims that "defining the field in this way would destroy its intellectual coherence and make it more difficult to devise solutions to any of these important problems" (Walt, 1991: p.231).

Some scholars have also been sceptical about linking the environment to the military sphere because they consider that by linking them one could contribute to militarise the environment instead of greening the military. As is pointed out by Elliot (1998), even though environmental stress is identified as a non-military threat, environmental politics are militarised since the threat element is defined in the analysis not by the impact on human security or even economic security, but by its relationship through the potential for conflict with the military and geopolitical security of the state (Elliot, 1998: p. 230).

In another line of reasoning authors such as Finger (1991) identifies military activities and the conflicting security paradigm as significant causes of environmental degradation. Thus, for example Finger argues that because environmental decline is seen as a threat to national security, the military is seen by many as part of the solution to the crisis rather than one of its major causes (Finger, 1991: p. 220). For the above situation Finger argues that the tangible instruments of security should be excluded from playing a role in addressing environmental problems.[15]

Finally, criticism has also been formulated in terms of the use of this framework to divert attention from responsibility and contribution by the North in today's environmental problems. In fact, if one pays attention to the language behind the concept of environmental security it is possible to perceive that most of the "blame" is placed on the environmental

[14] See the works by Simon, Julian. (1989). "*Staying Alive: Women, Ecology and Development*". London. Zed books; Walt Stephen, (1991). "The Renaissance of Security Studies" *In International studies Quarterly*. 35: 211-239; and Gray C. Boyden and David B. Riukin, (1991). "A no Regrets Environmental Policy." In *Foreign Policy*, No.83, pp.47-65.

[15] Finger, Mathias. (1991). "The Military, the Nation State and the Environment". In *The Ecologist*, No.21, pp.220-225.

problems in the South. Thus, there is a fear that the environmental security framework could be used in order to justify interventions in developing countries.[16]

In conclusion some of the mentioned criticism can be directly related to the current situation in the Brazilian Amazon. For instance, one of the basic worries in current Amazonia is the so-called internationalisation of the Amazon. Thus, on various occasions Brazil has been asked to assume its responsibility vis-à-vis the international community. The so-called internationalisation of the Amazon has been perceived as a real threat in Brazilian circles. More specifically it can be conceived as an effort by the North to divert attention from its responsibility and contribution in the global environmental crisis. Therefore, securitisation of the environment in the Brazilian Amazon can be taken as an excuse to justify the intervention of external forces in the region. However, at the local level a similar worry exists due to the fact that linking security issues to environmental matters in the Brazilian Amazon could contribute to even more militarisation of the environment instead of making the military industry "green". It is well known that the Brazilian army has been a key player in the management of the Brazilian Amazon. The basic problem for some observers is that by linking environment and security one of the agents responsible for the process of environmental changes (the army) can be presented as the main agent responsible for minimising environmental threats.

2.4 Understanding the Brazilian Amazon under the environmental security framework. A preliminary evaluation

When can we speak of an environmental problem as a security issue?

The above question is relevant to this study since the answer provides the main elements for understanding the relationship between security and the environment in the Brazilian Amazon as well as offering an opportunity to see how the securitisation process works.[17] In answering that question I will use two variables that have been mentioned by Buzan, Wæver and de Wilde (1998): the existence of existential threats, and the need to take extraordinary measures to handle them. Therefore, in the case of the Brazilian Amazon it is important to ask *what is the referent object? What specific types of existential threats are the referent object facing?* And finally, to explore if extraordinary measures have been taken.

Referent object. In the environmental sector two different referent objects are presented: the environment itself and the nexus of civilisations and the environment (Buzan, Wæver and de Wilde: 1998, p.76). These two levels are of great importance in the Brazilian Amazon due to the fact that for some agents the sustainable use of the natural resources contained in the Amazon are crucial in order to preserve the living of several social groups. Much of the attention focuses on how the process of environmental change is posing a threat to the survival of social groups such as the Yanomani, the Kayapó, the Waimiri-Atroari, the rubber tappers and the *caboclos*. The environment itself is less likely to be the referent object of a

[16] To see arguments related to the last two critics see Daniel Deudney "The Case Against Linking Environmental Degradation to Security" *Millennium*, 19 (1990); Somaya Saad "For Whose Benefit? Redefining Security" *Eco-Decision*, September 1991, pp.-59-60; Ken Conca "In the Name of Sustainability: Peace Studies and Environmental Discourse" *Peace and Change*, 19: 2 (1994).

[17] According to Buzan, Wæaver and de Wilde (1998), the securitization process means that an issue is presented as posing an existential threat to a designated referent object. Thus, for them the special nature of security threats justifies the use of extraordinary measures to handle them.

securitisation process in the Brazilian Amazon. However, potential securitising actors such as Greenpeace have made the environment itself the main referent object.

Existential threats. If one accepts that existential threats can only be understood in relation to the particular character of the referent object in question, then the existential threats in the Brazilian Amazon come basically from the process of environmental change, via deforestation, pollution from mining activities and flooding as a result of hydroelectric projects. For example the construction of the Balbina Dam, located on the Uatuma River posed a security threat to the existence of the Waimiri-Atroari Indians. The reason for this accusation was that the reservoir flooded an area of approximately 2,346 km2, the largest part of it comprised untouched forest until 1970 (Cummings, 1990: p.44). Around 311 km2 of the territory flooded was inside the already reduced reserve of the Waimiri-Atroari. The flooding transformed all the headwaters of the *igarapé* Santo Antonio do Abonari, *igarapé* Taquari, and river Uatumâ into an uninhabitable area with putrefaction of the submerged tropical forest, rendering the water unfit for any human use. Finally, I would like to point out that the conceptualisation of environmental threats in the Brazilian Amazon is relatively new, therefore, the character of existential threats is still unclear to several actors, and as a result the need to take extraordinary measures remain unclear.

Extraordinary measures. It is hard to argue that extraordinary measures have been taken in the Brazilian Amazon. It can not be said that the environment takes priority over everything else and therefore allows for a breaking of the rules. What can be said is that environmental factors in the Amazon are strongly related to factors such as land distribution, mineral exploitation and Indian land demarcation, and it is within this context that the nexus of civilisations and the environment has become to a certain extent politicised and perhaps securitised by several actors in the Brazilian Amazon. However, what is evident is that these new types of threats and consequently the adoption of potential extraordinary measures are not handled by a new institution. In the Brazilian Amazon they are still handled by the same institutions that deal with the military security.

Summarising the argument. Considering all the above elements the final question of this section is: *Have environmental matters in the Brazilian Amazon been securitised or have they just been politicised?* Even though it is not easy in practice to draw the line between the politicisation process and the securitisation process, an initial evaluation shows that in the case of the Brazilian Amazon the environment as issue has been politicised rather than securitised. Taking the distinction used by Buzan, Wæver and de Wilde (1998) an issue is politicised when that issue is part of public policy, requiring government decision and resource allocation. The above can be easily perceived in the Brazilian Amazon. As will be noted in the following chapter all the Brazilian governments since Getulio Vargas up to the present with Fernando H. Cardoso have dedicated great effort to oversee the development of the Amazon. Thus, several federal state agencies have been created to deal with the Amazon, large amounts of resources have been allocated and big-scale projects have been undertaken. In the first case (state agencies), one can mention the creation of the Bank of Amazonia (BASA), the Northern Brazil Electricity Board (ELECTRONORTE), the National Indian Foundation (FUNAI) and the Ministry of the Environment, Water Resources and Legal Amazon (MMA). In addition, great amounts of resources have been allocated as incentives to develop different projects. Illustrative of this are the cases of the Superintendency for the Development of the Amazon (SUDAM), the Investment Fund for Amazônia (FINAM), the Programme of Agricultural and Agro-Mineral Poles of Amazônia (POLAMAZONIA) and the Information and Surveillance Service for the Amazon (SIVAM). Finally, considerable infrastructure has been developed in the area. Good examples are the Belém-Brasilia highway, the Balbina and Tucurruí Dam, the Ferro do Carajás, the Transamazonas highway, and the infrastructure associated to the Greater Carajás Programme.

2.5 Environmental related conflicts

The previous sections described and discussed the attempt to redefine security by introducing the environmental variable. One of the basic conclusions was that in order to have a process of environmental security, a securitisation of the referent object should take place. Now, if the full process of securitisation does not occur, one could be dealing with environmental related conflicts instead of environmental security. This is due to the fact that the environmental issue has been politicised, but perhaps not securitised. Thus, this short section responds synoptically to *how are environmental aspects related to conflicts?* To answer this question I develop a matrix based on the main literature relating environment to conflict.

a) Environmental disruption can be the cause of international and/or internal conflict. On an international level the problem over access to water in the Middle East can be mentioned as an example.[18] Another example on a national level is the violence and social unrest in the Brazilian State of Rondônia.
b) Environmental disruption can be the consequence of international and/or internal conflict. An example on the international level is the Gulf war in 1991. The problem of soil erosion in El Salvador as a result of the civil war could be cited on a national level.
c) Environmental degradation may exacerbate conflicts originated for other reasons. Illustrations of such cases are Rwanda, as well as the impact of water dispute in the separatist movement in the Indian province of Punjab.[19]
d) The way of sharing one given natural resource can be cause of conflict. On example is the hydroelectric project on the Brahmaputra river and the resulting Indo-Bangladesh tension.
e) Environmental disruption can be a severe threat to the existence of certain social groups. For example, the Indians Yanomani at the Brazilian-Venezuelan border.

It is important to emphasise in the final analysis of this section that the relationship between environment and conflict is reciprocal. Environment and conflict can interact in a number of ways as shown above. The linkages between them are often complex and working in both directions. For instance, as military activities can have severe effects on the environment, environmental factors, in turn, could undermine the stability of a country. The above is certainly important due to the fact that in some of the literature one may still see a high degree of unilinear analysis, what Lipschutz (1997) calls *environmental determinism*.

2.6 Getting down to earth: Adding environment to conflict

What is an environmental conflict? Since 1984 various authors have tried to explore how environmental stress (basically in the form of scarcity and degradation) is leading to conflict.

[18] It is important to be cautious when placing the role of water as a factor generating conflict in the Middle East. In principle, it is clear that water (Jordan River) is not a sole cause of conflict. Thus, open conflicts in the region are explained by the interaction of water scarcity with other factors such as border disputes and religious beliefs.

[19] The province of Punjab has been dominated by the Sikh movement which traditionally has been provided with water from the Beas, Sutlej and Ravi rivers. But the demands in the downstream provinces Rajsthan and Haryana led to the decision of the central government to construct canals and to divert 60 per cent of Punjab's water and energy to those Hindu dominated communities. This became one of the main reasons for the Sikh party (Akali Dal) to ask for autonomy in the 1970s and led to a subsequent violent secessionist movement. For more information on these conflicts see Shaukat Hassan "Problem of Internal Stability in South Asia". *PSIS, Occasional Paper*, no.1, 1988, pp.24-25.

[20] Nevertheless, it is during the 1990s that most of the work has been done. Besides the empirical research work done by the research teams in Toronto and Zurich, other authors have presented scenarios exhibiting violence because of environmental factors. One example is the article by Robert Kaplan (1994) entitled *"The coming anarchy"*, in which he describes a scenario of violence and conflict related to environmental degradation.[21] He takes examples from West Africa, showing how this region is becoming the symbol of world-wide demographic environmental and societal stress. Another case is the working paper *"Imminent political conflicts arising from China's environmental crisis"* by Jack Goldstone (1992). He argues that the combination of population growth and overburdened arable land has been a source of conflict in China for several hundred years.

Despite of the existent literature, explicit definitions of environmental conflicts are scarce.[22] As examples, let us consider the two most important research groups in the field. In the work of Homer-Dixon and associates there is no definition. It is the Swiss group that has provided a definition. In the words of one of its participants, environmental conflict "is a conflict caused by the environmental scarcity of a resource, that means: a human-made disturbance of the normal regeneration rate of a renewable resource" (Libiszewski, 1992: p.6). Thus, a conflict over agricultural land is an environmental conflict if the land becomes an object of contention as a result of soil erosion or climate change, but not in the case of ordinary territorial or colonial conflict or an anti-regime civil war aiming at the redistribution of land. As can be seen the ENCOP definition only considers environmental disturbance caused by human activities, while excluding natural events in their analysis. The problem is that it is sometime difficult to draw a line between the two. What is also important to see is that the Swiss group defines environmental conflict in relation to scarcity, as does the Toronto group.[23] Once again this could be problematic because it implicitly assumes that scarcity of resources is a central element explaining violent conflicts.

For the purpose of this study I understand environmental conflicts as *open conflicts induced by the process of environmental change*. Three considerations are important here. First of all, the word *induced* implies that I am not arguing that environmental change has to be the sole cause of a given conflict. Very often the process of environmental change exacerbates other social, economic and political factors that ultimately generate open conflicts. Secondly, the word open conflict means that a threshold is defined for the dependent variable. In this context open conflict means *manifest* conflict, thus when a conflict situation is accompanied by violent behaviour. Finally, for the purposes of this research the

[20] Among the works developed are: Molvær (1992), Libiszewski (1992), Boge (1992), Gleick (1991) and Homer Dixon (1991, 1993, 1994).

[21] This article appeared in *The Atlantic Monthly*, February 1994: 45-76. An argument against this position is held by Alexander Cockburn; he called Kaplan thesis catastrophic impressionism.

[22] One of these definitions has been provided by resource geographer Trolldalen (1992). For him international environmental conflicts pose a conflict of interests in any situation where the utilisation of natural resources in one country has negative environmental impacts for another country or group of countries.

[22] By the Toronto group I mean the group that under the leadership of Thomas Homer-Dixon explored the links between environmental scarcities and violent conflicts in different regions of the worlds.

[23] By the Toronto group I mean the group that under the leadership of Thomas Homer-Dixon explored the links between environmental scarcities and violent conflicts in different regions of the worlds

process of environmental change can be seen as caused either by human activities or by natural events. After all, they interact in many different ways.

In the following section I will discuss the research carried out by the ENCOP and Toronto groups recognising that those have been the most influential works in the academic and political communities.

2.7 Environmental scarcity and violent conflict: An assessment

What are the core research design elements developed by the Toronto and the ENCOP groups?

The Environment and Conflict Project. ENCOP conceived environmental conflicts as traditional conflicts induced by environmental degradation. Thus, their working definition stated that environmental conflicts are characterised by the principal importance of degradation in one or more of the following fields: overuse of renewable resources, overstrain of the environment's sink capacity, and impoverishment of the space of living (Libiszewski, 1992: p.13).

Maldevelopment and environmental discrimination were the two *master* variables adopted in order to understand the role of the environment in conflict.[24] Based on the identification of some critical scenarios, ENCOP divided the types of environmentally induced conflicts into three preliminary levels.[25]

a. When the environment plays a role between groups within a country
b. When internal conflicts become internationalised, often through population displacement
c. When interstate conflict arises from the degradation of regional environments or the global commons.[26]

For the purpose of this study the first level (inter group relations) has priority. As will be explained in the next chapters, actors in the Brazilian Amazon are highly dependent on the Amazonian environment, therefore competition is often fierce. However, the second and third level can also be observed. In fact, if one looks at the system level several subnational problems such as the survival of indigenous groups (the Yanomani is a case in point) has become internationalised resulting in latent conflicts between Brazilian authorities and some international forces, mainly NGOs. Finally, one may also perceive a certain level of international disagreement in the way the Amazon should be managed. Evident from the proceeding discussion is that it is not easy to designate one given conflict as being strictly formed at one specific level. This justifies the importance of using a systemic view when evaluating the scenarios and the dynamics of social conflicts in the Brazilian Amazon.

The conclusions by ENCOP researchers are not so different from the ones by the Toronto group. The ENCOP investigators view their evidence as confirming the Toronto project

[24] Environmental discrimination occurs when distinct actors (based on their international position and/or their social, ethnic, linguistic, religious or regional identity) experience inequality through systematically restricted access to natural capital (productive renewable resources) relative to other actors (Bächler, 1998).

[25] According to ENCOP, crisis areas most susceptible to environmentally induced conflict include: arid and semi-arid plains (drylands), mountain areas with highlands-lowlands interactions, arenas with river basins subdivided by state boundaries, zones degraded by mining and dams, tropical forest belts, and poverty clusters of sprawling metropolis.

[26] Taken from the IHDP report No.11 "Global Environmental Change and Human Security". *Science Plan.* June, 1999.

hypothesis on links between environmental scarcity and subnational conflict. In addition, the leaders of ENCOP (Bächler and Spillmann) at the end stressed that social, political, and economic factors also played key causal roles, thus the environment is usually not sufficient cause for conflict. An interesting conclusion of the ENCOP group for future research is the need for distinguishing between the different contributing roles (trigger, target, channel, and catalyst) that environmental transformation can play in conflict.

The Toronto group. Under the direction of Thomas Homer-Dixon this second group was formed at the University of Toronto. This group explored the relationship between environmental scarcity and violent conflicts through several case studies in developing countries, starting from the hypothesis that in these scenarios environmental conflicts are most likely to take place.[27] Their work remains very much at the subnational level (ethnic clashes, civil strife), which is somewhat different from the work at national level developed by Westing (1986).[28] The work developed by the Toronto group could be understood as an attempt to operationalise the links between environmental factors and conflict.

The main research question in the work of this group is: Does environmental scarcity contribute to violence in developing countries? If so, how does it contribute? At a general level the formulation that Homer-Dixon and his colleagues use is as follows: Can variable X (scarcity) cause changes in variable Y (violent conflict). Thus indicating that they are not interested in the whole range of factors that currently cause changes in the value of the dependent variable (violent conflict). Instead, they want to know whether and how environmental scarcity can cause violent conflict, and in this way identify possible causal roles of environmental scarcity.

Dixon and his colleagues developed two research programs. The first one is entitled "*Project on environmental scarcities, state capacity and civil violence"*, and the second "*Project on environment, population and security"*. [29] The core role of scarcity could also be seen in the basic aim of his first project where it is stated: "The project sought to determine if scarcities of cropland, forest, and other renewable resources are decreasing the capabilities of governments in the developing world and, if so, whether this raises the probability of widespread civil violence".

What does the Toronto group mean by scarcity? According to Homer-Dixon and Percival (1996) scarcity encompasses mainly three variables: cropland, water and forest (fuelwood). Moreover, for this group there are three types of environmental scarcity: supply-induced scarcity that results from the degradation and depletion of a resource; demand-induced scarcity caused by population growth and/or increases in per-capita consumption; and finally, structural scarcity which arises from unequal social distribution that concentrates the

[27] The case studies of the Toronto group on the relationship between environmental scarcity and violent conflict under the program Environment, Population and Security includes: The cases of Chiapas (Howard & Homer-Dixon); Gaza (Kelly & Homer Dixon); Pakistan (Gizewsky & Homer-Dixon); South Africa (Percival & Homer-Dixon), and Rwanda (Percival & Homer-Dixon).

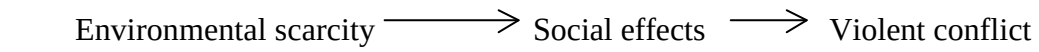
[28] By national level I mean the interstate conflict dimension. Arthur Westing (1986) identifies 12 conflicts in the twentieth century that he maintains did contain distinct resources as components.

[29] The project on Environmental Scarcities, State Capacities, and Civil Violence began in January 1994, and released its results in a workshop at the Woodrow Wilson Center in Washington in May 1997. It includes the cases of Indonesia (Charles Barber), China (Elizabeth Economy), and India (Thomas Homer-Dixon & Valerie Percival).

resources in the hands of relatively few people, while the remaining population suffers from shortages.

Thus, in the *Project on environment population and security* the Toronto group concludes: "Under certain circumstances, scarcities of renewable resources such as croplands, fresh water, and forest produce civil violence and instability. However, the role of this "environmental scarcity" is often obscure. Environmental scarcity acts mainly by generating intermediate social effects, such as poverty and migration, that analysts often interpret as conflict's immediate causes". (Homer-Dixon, 1996: p.45). Moreover, this is reflected in the case studies done by the group such as in the South African case where it is stated that scarcities of renewable resources in the context of the apartheid system and the transition to majority rule contribute to violence (Percival & Homer-Dixon, 1995: p.297). As can be seen through such examples, scarcity is the core concept. The following diagram can be understood in light of the aforementioned key finding by the Toronto group.

Figure 2: Toronto model



In conclusion one can argued that although the studies by the Toronto and ENCOP groups have not been fully accepted by the academic community, it should be said that both of them represent an important point of departure for analysing the role of environmental factors in generating conflicts. Even though there is a high level of determinism in the research design, both groups recognise the importance of other factors in explaining conflicts. At the same time however, they argue that environmental scarcity in several scenarios is in fact an important contributor to conflict, therefore it is justifiable to study environmental scarcity as one important independent variable explaining conflict.

2.8 Limitations of the work carried out by the Toronto group

The work carried out by the Toronto group has been undoubtedly the most debated. In this section I shall therefore respond to the question *what are the main limitations of the scarcity violent conflict model?* Even though this work has been an important contribution to the understanding of the role of scarcity in violent conflict there are still several points that should be addressed. I would basically challenge the model with respect to its deterministic research design. As Lipschutz (1997) has also noted, in this kind of model natural resources are axiomatically taken to be scarce and therefore the object of struggle between different actors.

In line with the previous argumentation, are the research projects formulated by the International Peace Research Institute (PRIO) and the Fridtjof Nansen Institute (FNI) on environment, poverty and conflict (Smith & Østreng. eds.,1997). They argue that poverty plays an important role in causing and explaining violent conflicts, and also that poverty has been neglected in analyses on environmental scarcities and violent conflicts. The problem of course is once again the conceptual limits of poverty. In the same project Østreng (1997) states that poverty will be perceived along the lines of the Human Development Index as understood by the United Nations Development Program. However, the problem is that if one wants to see the specific contribution of different factors, it is better to define a threshold for each variable. Otherwise if one uses a very general variable such as poverty that includes many factors within it (life expectancy, literacy, and GDP per capita), it is very likely that one is going to find what one is looking for.

An important critique has been formulated in terms of the selection of null cases. In the work by Dixon and associates case studies are chosen where both environmental change and

violent conflict take place, thus there is no variation in the dependent and independent variable.

Another point is made by Gleditsch (1998). He notes that theories linking environmental degradation to violence need to specify whether they are addressing domestic or interstate violence. In a way this does not seem to have a real problem, because most of the work has been done at the domestic level. This point is confirmed by one of the conclusions of the Toronto group: "Environmental scarcities rarely, if ever, cause interstate war. Instead, it contributes to chronic and diffuse strife within countries" (Homer-Dixon, 1996: p.46). I would argue that even though the work is focused at the sub-national level, the state is always placed as the only agent, therefore, the outcome is formulated in terms of war. Thus, it can be observed that there will be an initial problem of marginalisation of intrasystemic actors by placing the state as omnipotent actor (even though the analyses are done at a domestic level), and secondly, the referred outcome of the process is always war.

One of the strongest criticisms of the results of this project comes from Marc Levy. Referring to the results he states that the conclusions of the research project are quite obvious, and they do not provide any new information. Thus, Levy (1996) argues that we have more anecdotes but no more understanding. Related to that point Levy argues that it is difficult to imagine how conflict in any developing country could not involve renewable resources. However, as argued by Homer-Dixon, there are many conflicts in developing countries in which renewable resources are not involved, except in a peripheral sense.[30]

In conclusion, although the Toronto group has faced strong criticism I consider that there are two important contributions that can be attributed to the work carried out by the group. First, there is a positive effort in trying to operationalise the links between environmental scarcity and violent conflicts. Whether this has been fully achieved is still a subject for discussion. In addition, it has contributed to calling the attention of the academic and political communities to the relationship between the two mentioned variables in a way that was never seen before.

2.9 Concluding remarks

The main conclusions arising from the argumentation presented in this chapter are the following:

First of all, it seems that nowadays we face new types of threats, not only the traditional military threat. The Brazilian Amazon can represent a good example of how these new threats manifest themselves, and how the different actors are responding to such threats. In addition, the involvement of new actors as securitising actors or as actors threatened by a particular environmental threat reinforce the argument of supporting a wider perspective of security. After all, if security is about survival it is clear that several social groups in the Brazilian Amazon face what can be called existential threats.

Secondly, the conceptualisation of the environment itself and the environment and the nexus to civilisation as referent objects of environmental security could imply a particular role for the military establishment; this is due to the fact that the army is the most powerful institution dealing with these new threats.

Thirdly, despite the criticism of the environmental security approach, it is a fact that the environment has been incorporated into the language of official and military organisations. As

[30] Examples provided by Homer-Dixon are: Sri Lankan civil war, the insurgency in Kashmir, the war in Afghanistan, the drug conflicts in Colombia, and the dispute between the Polisario and Morocco over the Western Sahara.

illustration the former USA Secretary of State, Warren Christopher (April 9, 1996), in a discourse at the Stanford University argued that *"The environment has a profound impact on our national interests in two ways: First, environmental forces transcend borders and oceans to threaten directly the health, prosperity and jobs of American citizens. Second, addressing natural resources issues is frequently critical to achieving political and economical stability, and to pursuing our strategic goal around the world"*. In the same way NATO has also acknowledged environmental problems as security threats. NATO's strategic concept now states that "*…risks to Allied security are less likely to result from calculated aggression against the territory of the Allies than from the adverse consequences of instabilities (…) and that security and stability have inter alia environmental elements as well as the indispensable defence dimension*" (cited by Elliot, 1998: p.230).

The fourth conclusion can be formulated as a question. *How useful are the arguments of the ENCOP and Toronto research groups for this study?* Let us start by saying that the main argument of both groups seems to be defendable. In fact, environmental factors under certain circumstances (notably when there is environmental scarcity or a process of acute environmental change) can play a role in explaining the emergence of certain social conflicts. However, it is still unclear what specific role environmental factors play. In other words, even though it is widely recognised that they are not the sole cause of social conflicts, most of the studies have not been clear enough in pointing out whether environmental factors can be considered background reasons, triggers, aggravators, or catalysts. Hence, the study of such roles in the Brazilian Amazon can be an important academic task.

From what I have presented in this chapter, the contribution of both research groups to the field it is unquestionable. However, there is one final important consideration. I move further in the conceptualisation of environmental change as an independent variable. In this study I do not define environmental change as the ENCOP group does. Thus, I defend the idea that environmental change covers both the natural and human-induced perturbations of the Brazilian Amazon environment.

Another important contribution is that ENCOP researchers pointed out that one of the main areas for environmental induced conflicts are tropical forest belts and zones degraded by mining and dams. Thus, it is in this context that research in the largest area of tropical forest in the world (the Amazon) has great relevance. For instance, activities such as large mining operations and dam constructions in the Amazon further undercut the marginal groups that highly depend on natural resources for survival. Therefore, research in the tropical rain forest of the Amazon is important not only to confirm or reject the *crisis areas* identified by the ENCOP group, especially when very little is known on environmental induced conflicts in the Brazilian Amazon.

Finally, an important contribution of both projects is associated with the need to conceptualise social conflict within a multicausality and interactive framework. The crcial consideration stated by both groups is that environmental factors are related to social, economic and political factors. That is why this study along with environmental change takes into consideration such variables as land distribution, allocation of resources and population growth.

CHAPTER III. FRAMEWORK OF ANALYSIS TO GRASP THE RELATIONSHIP BETWEEN ENVIRONMENTAL CHANGE AND SOCIAL CONFLICT IN THE BRAZILIAN AMAZON

Worlds are constructed against the background of earlier worlds; all creations and mental images are theory impregnated and contextually given. Thus, even the physical world is not more "real" than any other representation of the world (...) even causation so important in science, is in itself merely a mental construct imposed on mere sequences of events. **(Bruner, 1986)**

3.1 Introduction

This chapter displays the framework of analysis that will be used in this study. The first section of this chapter attempts to answer three questions. *What is a system? What can be explained through a system perspective? And why do I apply a systemic perspective to the evaluation of the Brazilian Amazon?*

The following sections show the main elements to be taken into consideration in the analysis of the research problem and in the process of answering the research questions. In order to do so, section 3.3 revises some of the elements presented in the previous chapter. The aim is to overcome some of the difficulties found in past research when analysing environmental aspects were analysed in relation to security and conflict matters. Sections 3.4, 3.5 and 3.6 provide a conceptualisation of environmental change as independent variable and social conflicts as a dependent variable. Finally, section 3.7 shows the main proposition of this dissertation as a preamble for the presentation in the following chapters (IV, V, VI, VII and VIII) of the empirical data supporting or questioning the propositions.

3.2 The importance of a systemic perspective

What is a system?

The term system recognises per se a basic feature of life, which is the interrelation process. Therefore, terms such as interdependence and interaction have been closely related to the systemic thinking.

Among the classic definitions of system, the ones provided by Rapoport and von Bertalanfly can be quoted. Anatol Rapoport (1968) stated that "A whole which functions as a whole by virtue of the interdependence of its parts is called a system." Ludwig von Bertalanfly (1956, 1993), the "*father*" of the system theory, suggested that a system "implies any arrangement or combination of parts or elements in a whole, which may apply to a cell, a human being, or a society".[31]

[31] According to Varma (1988) the systemic thinking in international relations has had three major trends. The first one is the Chicago-Michigan School. This school is concerned with the development of system concepts for use in the behavioural sciences. Among the fellows in this school one could identify David Easton, Morton Kaplan, James Miller, and Anatol Rapoport. The second school of thought is the MIT-Harvard which is rooted in political cybernetics, information theory, and communication theory. The theoretical position of the political cybernetics is that all systems are held together by communications. One could mention in this school the names of Talcott Parson, Karl Deutsh, Ernst Haas, and McClelland. The third school is the world society tradition, John Burton is basically the name associated to it. The world society according to him is composed of cross-cutting relationships wherein the values and expectations of individuals, communities, national societies, nation-states and transnational systems form complex sets of overlapping and interacting networks. His work has been close to the one done at the Centre for Conflict Analysis in London including the

Independent of what kind of definition one adopts all of them will reflect the three basic components of any system. First, there are *elements*, which comprise the parts of the system. These parts or subsystems, are not mere levels of analysis, they are also actual levels of social and political reality. The two main subsystems that I will deal with are Roraima and Pará. The second component is *interaction*. This component can experience different levels of interaction depending on how intense and important the links are. The last component is *structure*, which is the arrangement of concrete system parts, and is related to the parts of the system. The structure is more durable and normally more difficult to alter than the interactions. The structure of the Brazilian Amazon as well as of Roraima and Pará will be deduced from the main attributes of the basin.[32] For the purpose of this dissertation the unit of analysis is the *Brazilian Amazon*.

The systemic perspective is adopted under the assumption that "the whole is more than the sum of its parts". That simply means that the understanding of current events in the Brazilian Amazon cannot be done by looking just at the subsystems (federal Amazonian states) in an isolated way, but by observing the web of relationships that link subsystems, the system, and the suprasystem. This study maintains a basic assumption which is that to a large extent the behaviour of the system is determine by the dynamic of stimulus and response (inputs and outputs) with the subsystems and the suprasystem. In summary, the systemic perspective facilitates the process of identifying distinct influences as well as understanding the interactions occurring between the Amazon, Roraima, Pará and the International community.

What can be explained through a systemic perspective? The systemic perspective can be very useful when explaining:

a) The interaction patterns of complexes of elements. In this dissertation this will mean the level of interaction between ecosystem disturbance (deforestation, soil erosion, and flooding) and the dynamics of latent and manifest conflicts in the Brazilian Amazon.
b) The relationship between the system under study and its suprasystem[33] (in particular the input from the suprasystem to the system and the system's output to the suprasystem). Exemplifying this would be the role of international agents in influencing Amazonian policies (NGOs, multilateral institutions) and the Brazilian response to such input.
c) The pattern of interaction both among subsystems and between subsystems and the whole system. In the case studies it will be noted how in many circumstances subsystems are closely related. For instance, gold mining in Roraima has influenced the development of cattle ranching in Pará, due to the fact that many wealthy *garimpeiros* from Roraima have

---

names of C. R Mitchell, and Richard Little. In a way this school has its counter-part in the United State with the work of James Rosenau and G. Modelski.

[32] There have been two major critiques of systemic thinking. The first one is related to the introduction of *organismic* concepts into the discussion of politics and international politics. For instance Stanley Hoffmann (1960, 1961) argued that system theorists use inappropriate techniques borrowed from other disciplines such as sociology, economics, cybernetics, biology, and astronomy. The second main critique has to do with the nature of the theory. It has been argued that it is very much in favour of the status quo, due to the emphasis on the notions of stability, equilibrium, adaptation, and steady state. In my case the use of the concept "steady state" does not mean that (further) changes do not occur. What it means is that the variables maintain a dynamic change.

[33] From now on I will use the word suprasystem instead of environment to refer to what is out of the system. The above is to avoid confusion with the use of the word environment in the context of conservation, preservation, or environmental change.

become *fazendeiros* in Pará. Therefore, by relating subsystems one can better understand the research problem not only at a subsystem level, but also at the system level. Moreover, the relationship between the system and the suprasystem is implied.

From the above elements it can be deduced that the main focus of the systemic perspective is the study of the interplay between subsystems, system, and the suprasystem. The structure of the system is defined by the entire interconnection of parts that comprise the system. Consequently, the implication is that it is the network of relations, not primarily the nature of the elements that define a system. To use an isomorphism one could say that in a nerve system it is the network of connections that determines the path of excitation and therefore behaviour.

Why do I apply a systemic perspective to the evaluation of the Brazilian Amazon?

The discussion of social conflicts in the Brazilian Amazon and the particular contribution of environmental change have been placed within the system perspective because:

a) The Brazilian Amazon as an ecogeographical entity constitutes an open system. The Brazilian Amazon is not a homogeneous, but a highly complex open system.[34] Therefore, in the Brazilian Amazon no single component can have an entirely separate existence. On the contrary, each component in some way affects and, in turn, is affected by all the other components.[35]

b) The behaviour of the agents (social groups) involved in the area of study are strongly influenced by the components of the entity under study (Brazilian Amazon). This is to say that to a certain extent one can understand the dynamics of *garimpeiros*, *fazendeiros*, Indians, *caboclos*, *posseiros*, *sem terra*, etc. by looking at the relationship between the system and the subsystems, as well as the type of structure resulting from their interrelation.

c) As a corollary, a systemic understanding of the Brazilian Amazon covers both the natural and socio-economic aspects of man and his activities. His interaction with the natural environment, his use of natural resources and the technology applied in the exploitation of these natural resources should be seen as parts of an integrated system.

3.3 The proposal: Explaining change and continuity in the present study

Based on what has been presented in the previous chapter, the aim of this section is to show how my study differs from the work carried out by the ENCOP and Toronto groups. The first difference comes from adopting a system approach. In fact, I use the system approach to decompose a large system (the Brazilian Amazon) into subsystems (Roraima and Pará). Thus, I relate the parts to the whole and the whole to the parts. The above is essential in order to understand that neither the Amazon nor Roraima and Pará are isolated units.

[34] The Amazon basin is not homogeneous neither in terms of the natural conditions nor in socio-political terms. However, in the analysis it is considered as a system.

[35] An operationalization of this idea can be made by explaining the failure of the *Polonoroeste* project in the Brazilian Amazon. There the implementation of a huge project of colonisation schemes independent of the natural subsystem was one of the basic causes of the disastrous failure of this project located in the state of Rondônia.

The second difference is related to the dependent variable. In most of the earlier literature there is no clear indication of a threshold of the dependent variable. This has introduced confusion into the analysis. Reviewing the literature it seems to me that most of the work refers to violent conflict, meaning war.[36] To avoid methodological ambiguity in this dissertation the threshold of the dependent variable is *manifest conflicts* (see definition below). [37] To have a threshold is essential in order to see if one particular independent variable really matters or not. I have chosen to investigate the last stage of conflicts, under the assumption that by choosing a lower one such as *incipient* or *latent* I will not be able to separate this research from other relating general issues of environment and development.

A third difference is found in the actors included in the model. Even though most of the previous work has been done at the subnational level there has been a marginalization of intrasystemic actors. Hence, in the previous work the state has been the basic agent and/or referent object. In this study, the state is considered as one among several actors. The state is placed at a subnational level together with other important social actors such as miners, rubber tappers, Indians, landowners, landless, etc. At a national and international level other actors are considered too, such as corporations, multilateral financial institutions, NGOs etc.

Actors in the Brazilian Amazon represent a universe of many different and conflicting interests. In effect, small farmers, migrants, *grileiros*, landless, Indians, and large landowners fight for land. *Garimpeiros,* mining companies, and Indians get into conflict over the exploitation of mining sites. In addition, in this conflictive landscape there are environmental NGOs that want to preserve the ecosystems, while Brazil as a country wants to improve its position in the international market, and industrialised countries stress the need to develop international policies to protect the Amazon rain forest. Finally, international and national corporations are trying to defend their investments in the area, and multilateral institutions such as the World Bank and the Interamerican Development Bank continue to play an important role through their lending policies.

Another important difference between the present study and the others is related to the independent variables. I introduce not only one, but a set of four specific independent variables: allocation of resources, distribution of land, environmental change and population growth. The essential element here is to have more than one independent variable, so one can compare the contribution of one given independent variable in relation to others. I have chosen these four independent variables because I assume that they are the most important when explaining the emergence of social conflicts in the Brazilian Amazon. However, I am aware that there are other independent variables that in one way or another have also some explanatory power. In addition the selection of these four independent variables were made for the following reasons: first, because it will allow us to see the relative importance of each independent variable (especially environmental change) when changing the outcome of the dependent variable. Second, because four variables are a manageable number, thus moving away from determinism (one variable) and over-complex model (large number of independent

[36] This has been the case in the studies within the environmental security and environmental conflict approach. Besides this, some alternative models like the research proposal by the International Peace Institute (PRIO) and the Fridtjof Nansen Institute (1997), together with part of the critiques i.e., Wenche Hauge and Tanja Ellingsen (1998) focus on the outbreak of war.

[37] The threshold refers to the specific stage of a given phenomenon. It is the level or limit at which something begins to happen. In the context of this study manifest (open) conflict is the threshold of conflict. This mean that a relationship between environmental change and social conflicts can be argued to exist when conflicts have reached the manifest level no in any lower level such as incipient or latent stage.

variables). Finally, to have a set of four independent variables is not only important for comparative purposes between the different independent variables, but it will also provide a more systemic understanding by showing how these independent variables are not totally independent, but to a certain extend are related to each other.

Using this prior argument I will analyse the problem in a more systemic manner than by just studying scarcity as the main source of violent conflict (Homer-Dixon's model), but at the same time I will try to avoid excessive generalisation such as the argumentation presented in the research proposal by the International Peace Institute (PRIO) and the Fridtjof Nansen Institute (1997) that indicates that poverty is more relevant than environmental scarcity. Variables such as poverty are useful, but in a way are of quite general relevance. It is evident that poverty is present in most situations where social conflicts take place.

Another important difference in terms of the model is that I introduce variation in the independent and dependent variable. That means that the case studies are not selected on the criteria that all the independent and dependent variables are present and also score high. In the case studies of Roraima and Pará there is a variation in the scale of some independent variables as well as in the outcome of the dependent variable. Such differences are very important in order to study the specific contribution of each independent variable. It should be remembered that most of the previous work carried out has focused on cases where environmental scarcity and violent conflicts were present; these studies did not consider null-cases.

Finally, even though the aim of this dissertation is not to deal with negotiation as such, I recognise that under some circumstances independent high-ranking variables of social conflicts could lead to the other side of the coin, meaning non-conflict situations. As I will show in the case studies, negotiation has been an important factor, especially in the state of Pará. In fact, negotiation leading to non-conflict situation under a scenario of predictable social conflicts is an important differential factor between Pará and Roraima. For instance, contrary to the existing situation in other areas of the Brazilian Amazon, in Pará the Kayapó decided to negotiate with *garimpeiros* about the access and utilisation of their land instead of getting into direct confrontation.

3.4 Independent variables. Assessing environmental change

As I have mentioned I will explore the performance of four independent variables (allocation of resources, distribution of land, environmental change, and population growth). However, considering that the two research questions deal with environmental change, I will now discuss in some detail what is meant by environmental change and explain the threshold of this variable.

What is environmental change? I understand environmental change as a large-scale natural or human induced destabilising interference in the environment. The above definition includes human-made changes as well as natural events. As can be seen the focus is environmental change rather than environmental scarcity.

Most of the work up to now has made a distinction between non-renewable resources and renewable resources. The former are *stock resources* and refer to resources such as minerals, which has taken many years to form and the quantity of which is fixed. The latter, also called *flow resources*, are the ones naturally regenerated to provide new supply units within a certain span of time. The ENCOP and the Toronto group take into the analyses only renewable resources.

In this study when I refer to environmental change I will integrate both depletion of non-renewable resources, as well as the degradation of renewable resources into the discussion. One reason for doing so is that sometimes this division is unclear; after all many so-called

renewable resources are not renewable in any practical sense, e.g. some really endangered species or a completely degraded soil. On the other hand, some non-renewable resources are if not inexhaustible in an absolute sense, inexhaustible in a practical sense, because of technological substitution; e.g. coal and other minerals.

What is the contribution of environmental change to social conflicts? The contribution of environmental change to social conflicts in the Brazilian Amazon could be understood as *indirect and/or interactive.* This means that social conflicts are understood partially as the outcome of the social and environmental side effects of environmental change. Here the process of environmental change in relation to other variables can produce either social conflicts or widen the scope of existing conflicts. In the Brazilian Amazon this would mean that deforestation, pollution from mining activities, and flooding in connection with other sources will produce social conflicts and/or contribute to social conflicts by introducing more entropy to a system that is already in turbulence. However, what is going to be more important in the final analysis is to see what specific role environmental change as an independent variable is going to play, for instance as a trigger or aggravator. As a trigger environmental change basically releases accumulated non-environmental social pressures, and as an aggravating factor environmental change adds to others producing conflicts.

The notion of side effects is essential in this study. Following Homer-Dixon's (1996) categorisation, the main side effects of environmental change that expose some level of incidence on the dynamics of social conflicts. First there is *economic decline*, for instance decreases in agricultural production. The second is *population displacement*; the process of environmental change not only expels some groups, but in many cases it also brings another set of actors into the physical space. Finally, there is *ecological marginalization*, which is an impoverishment of the physical space that skews distribution and enlarges social gaps by concentrating natural resources in the hands of some groups.

3.5 What constitutes a conflict? Defining the threshold of the dependent variable

What is the suitable threshold for conflict in this study? From a systemic perspective conflict is a permanent feature of any open system. This is due to the permanent interactions between elements within the system, so normally there is a competition for positions and status within the system as well as competition for resources within it. In this perspective conflict is a kind of endemic aspect of life taking place at all levels of society. As such conflict can not be abolished, rather it could either minimised or managed. Discussions revolving around definitions of, the nature of, and type of conflicts are a never ending debate. Therefore, what I will do here is present the basic feature of this concept, while adopting a definition and typology to work with in the Brazilian Amazon.

There is a large number of definitions of conflicts. However, in most of them one could perceive a type of reasoning indicating that conflict exists when two or more social actors wish to carry out acts (goals) which are mutually incompatible. In that sense, each part perceives the other as an enemy or obstacle to reach a desired goal. This goal can be tangible (land) or intangible (power) and followed by aggression.[38]

[38] As examples A. Coser defines conflicts as "Struggle over values and claims to scarce status, power, and resources in which the aims of the opponents are to neutralise, injure, or eliminate their rivals" (Coser, 1956: p.3). Along the same lines Stagner (1967) defines conflict "as a situation in which two or more parts desire goals which they perceive as being obtainable by one or the other but not both (...) each party is mobilising energy to obtain a goal, a desired object or situation; and each party perceives the other as a barrier or threat to the goal" (Stagner, 1967).

What is important in defining a threshold of conflict is to understand that not every dispute ends up in manifest or open conflicts; in fact, many of them do not. As I have said, the threshold of social conflict will be manifest (open) conflict. That means that I concentrate on situations, in which the conflictive process is accompanied by violent conflict behaviour, meaning somatic violence.[39] Examples can be found in Roraima with the manifest (open) conflicts between miners and Indians and in Pará between landless and large-land owners.

What do I mean by social conflicts? I will understand social conflicts as social action carried out by actors sharing one given social framework which constitutes its system. Thus, social action is behaviour which is goal-oriented, but in addition defines a sort of social group identity. This is because the ideas, interests, etc. that define individuals become the basis for collective actions that engage participants in a dispute. In this sense, one can see opposing interests and, therefore, potential for conflicts. Thus, whenever I use the term social conflict it will be within this framework, meaning the condition under which one identifiable social group (e.g.. miners) is engaged in conscious opposition to one or more identifiable social groups (e.g.. Indians), because they are pursuing incompatible goals (land integrity versus mineral exploitation), and when this opposition is accompanied by violent behaviour.[40]

How do conflicts develop? There are three basic stages in the development of social conflicts, they are: *incipient stage, latent stage, and manifest conflict*. The first stage is a permanent one in which the parties get into the situation of exchanging energy as a result of the participation within a bigger system. That responds to the systemic principle of relation among the parties of the system. Of course such a predicament could either lead to latent conflicts or not.

Latent conflict represents the second stage, where we have a conflict situation in which the parties clearly have incompatible goals. Finally, we have a manifest or open conflicts which can be described as a conflict situation accompanied by manifestly violent behaviour. As I have previously pointed out, manifest conflict defines the threshold of my dependent variable.

To finish this section, it is necessary to point out how conflicts can become more complex, the so-called conflicts widening. As it is pointed out by Mitchell (1981), conflicts become more complex because other parties become involved in the original situation of goal incompatibility, either because they posses complementary goals, or because their interest leads to support one side rather than another. Moreover, conflicts change over time, which can contribute to making it more complex too. For instance, parties could become more absolute in the position they take up regarding particular goals, or because parties become adversaries across a wider range of issues. In summary, one can expect the above situation when the actors are unable to resolve specific issues in mutually acceptable ways within the existing system.

---

[39] Thought conflict is related to the deliberate use of force for one actor against another (physical violence), Galtung (1969) introduced the concept of *structural violence* as an attempt to enlarge the concept. He defines structural violence as "the avoidable deaths caused by social structures of society". Galtung focuses on the issues of income distribution, inequality, and opportunity to enjoy social services.

[40] This framework is taken from the argumentation by James Dougherty & Robert Pfaltzgraff in "*Contending Theories of International Relations*". Third Edition. Harper Colling Publisher.1990, p 187.

3.6 Typology of conflicts

To conclude with the analysis of the dependent variable, I would like to explain the typology of conflict that is going to be used in this dissertation. Conflicts could be classified in different ways, for instance, according to issues, actors, and/or regional criteria. Nevertheless, in this research I will use the typology developed by Vilhelm Aubert and Louis Kriesberg and mentioned by List and Rittberger (1992).[41] This typology is based on the distinction between *dissensual* and *consensual* conflicts.

What is a dissensual conflict? Those are the conflicts found when the parties differ in norms, values, beliefs, and/or preferences with respect to one given issue or situation. In general the actors get engaged in conflict because they disagree about what is in the desired "*state*" of affairs. Dissensual conflicts are divided in conflicts over *values* and *means* (see table No.1). Conflicts over means occur even though the parties agree about the nature of desirable ends. In simple words, the parties in conflict may agree about what they want, but disagree about what to do to in order to obtain it. In short, the element in conflict is the strategy to be pursued by the parties.

What is a consensual conflict? In this kind of conflict the actors are often confronted with a situation of scarcity in which every actor desires the same valued object, but cannot be fully satisfied because there is not enough for everybody. Here the dispute refers to a more concrete resource. Normally the dispute is about the possession and/or utilisation of one given resource. This type of conflict is basically a conflict of interest. List and Rittberger (1992) have divided consensual conflict in two types: conflict about *relatively assessed goods* and conflicts about *absolutely assessed goods* (see table No.1). The former includes aspects such as power and prestige, which do not have a tangible expression. This kind of conflict is not very likely in the environmental field, because even when power becomes a source of stress, its manifestation normally passes through a dispute over tangible things. Conflicts about absolutely assessed goods are, for example, disputes over clean and fresh water, food, forest, land, minerals, etc.

Table 1: Working typology of social conflicts in this dissertationable

Dissensual conflicts	Conflict about values	Conflicts about means
Consensual conflicts	Conflicts about relatively assessed goods	Conflicts about absolutely assessed goods

A central question is *why do I need this typology?* The differentiation between consensual and dissensual conflicts is useful at the analytical level for determining the intensity and/or "malignancy" of the three conflict issues under study in this dissertation: land conflicts, mining conflicts, and conflicts on Indian lands. Thus, I argue that consensual conflicts are more likely to reach the manifest (open) level of conflict than dissensual conflicts. If that proved to be truth one should expect more violence in consensual conflicts than in dissensual ones. The case studies on Roraima and Pará will provide the empirical data for testing the above argument.

[41] For this typology see in particular the articles Vilhem Aubert "Competition and Dissensus: Two Types of Conflict and of Conflict Resolution", in *Journal of Conflict Resolution* 7 (1963) 26-42; and Louis Kriesberg "Social conflict", in *Social Conflict* (Englewood Cliffs, NJ: Printece Hall, 1982) respectively.

Finally, it is imperative to understand that consensual and dissensual conflicts are not always independent of each other. For instance, very often values and cultural aspects influence people in finding either violent or peaceful ways for dealing with one given situation. At the same time the above is often linked to the nature of the object of contention (relatively or absolutely assessed goods). Moreover, I would like to clarify that I use the classification of dissensual and consensual conflicts without going into any further division. The objective for doing the above is to avoid making the ideal types of conflicts over-complex. After all, the primary aim of this research is not to establish a complex typology of social conflicts.

In conclusion, the typology of social conflicts will allow us to evaluate the following:

a) It will specify the particular conflict type and conflict issues in the two chosen subsystems scenarios (Roraima and Pará), explaining its relations to the independent variables, with particular attention to environmental change.

b) It will show the relationship between conflict type and conflict intensity. Hence, I will be able to explain if the particular existence of one given type of conflict (consensual or dissensual) defines a certain level of conflict intensity in Roraima and Pará.

3.7 General propositions of this dissertation

As a conclusion for this chapter I will present the main propositions for this study which aim to organise the main arguments contained in this study. Confronting them with the empirical data will be the main task to be carried out in the next chapters. These propositions are deduced from the research problem and constitute a preliminary answer to the research questions.

At the general level my basic propositions are the following:

1. *The dynamic of the Brazilian Amazon is the result of the continuous interactions between system and suprasystem factors. These interactions explain why environmental matters have been to a certain extent securitised in the Brazilian Amazon.*
2. *In the Brazilian Amazon no single variable by itself can explain social conflict. Therefore, simple hypothesis linking environmental disturbance to social conflicts have to be revised.*
3. *Social conflicts in the Brazilian Amazon are mainly a product of two system constraints: misallocation of resources and skewed land distribution. Environmental change in most cases is not a direct source of social conflicts, but an important aggravator factor of conflicts acting through its side-effects.*
4. *Disruption of economic activities and population displacement are the two most important side-effects of the process of environmental change in the Brazilian Amazon.*
5. *In the Brazilian Amazon environmental scarcity in most situations is not the leading factor producing social conflicts. Therefore, a hypothesis like the greater he natural resources available to the system, the less likely that conflicts are among its components, has to be revised.*
6. *Social conflicts in the Brazilian Amazon are related more to consensual conflicts than to dissensual conflicts. However, in most situations a combination of consensual and dissensual conflicts exists.*
7. *Differences in the outcome (social conflict) at the subsystem level (Roraima and Pará) are explained by how the frontier dynamic has influenced the performance of*

intervening variables such as allocation of resources, distribution of land, environmental change, and population growth. [42]

[42] Frontier dynamic is a concept associated to the *developmentalism* strategy implemented in the Brazilian Amazon. It is understood as the incorporation of the Brazilian Amazon into the national economy.

PART B: EVALUATING THE BRAZILIAN AMAZON AS AN OPEN SYSTEM

CHAPTER IV. THE HISTORICAL CONFIGURATION OF THE BRAZILIAN AMAZON.

Nothing will stop us in this movement which is, in the 20th Century, the highest task of civilising man: to conquer and dominate the valleys of the great equatorial torrents, transforming their blind force and their extraordinary fertility into discipline energy. The Amazon, under the impact of our will and our labour, shall cease to be a simple chapter in the history of the world and, made equivalent to other great rivers, shall become a chapter in the history of civilisation. (**Getúlio Vargas, speech given at Manaus, October 1940**)

Objective of this chapter

The aim of this chapter to provide an overview of the most important historical elements influencing the contemporary Amazon. The current situation in the Brazilian Amazon responds to a dynamic that has been developed since the discovery and the colonial period. Through the years this dynamic has enclosed two major myths: the richness of the Amazon basin, and the view of the Amazon as also being an open and non-exploited space. Consequently, this chapter presents the Orellana expedition, the Pombal period, the rubber boon economy, and the *developmentalism* strategy that took place after 1950 as the most relevant historical aspect for understanding the current Amazon. The above does not mean that those factors are the only ones, but they are the most important ones in relation to the research problem formulated in this dissertation.

4.1 Discovery: The road to the great river

The Amazon and its affluent represent the greatest river system on earth. About one fifth of all fresh water transported by rivers to the oceans passes through the Amazon River. The Brazilian Amazon extends over almost 5 million square kilometres, around 55 per cent of Brazil's total landmass. It contains about a third of the earth's remaining tropical forest and a very high portion of biological diversity. The Amazon is also home to an outstanding cultural diversity: indigenous groups, peasant communities, *Caboclos*, miners, forest dwellers, etc. All of them make a cultural mosaic. However, the Amazon is not what many people think. The Brazilian Amazon is not flat nor it is entirely covered by rainforest. Many areas of the Brazilian Amazon are covered by grassland (campo), upland savannah (cerrado), and annually flooded wetlands (várzea).[43] In addition most of the population living in the basin is urban, not rural.

The occupation process of the Amazon by outsiders began in 1500 with the expedition by Vicente Yanez Pinzón. Pinzón reached only the mouth of the Amazon River, which he named *Santa Maria de la Mar Dulce* (The freshwater sea). It is generally accepted that the European impact on the Amazon began at the end of the fifteenth century, with the Spanish, as well as Portuguese navigators' great interest in exploring the New World discovered by Columbus. The names of Jean Cousin, Américo Vespuccio, Vicente Yanez Pinzón and Diego de Lepe are cited as the first explorers reaching the mouth of the Amazon River. After Pinzón several

[43] Approximately 60 per cent of the Brazilian Amazon are covered by tropical rain forest. Grassland and savannahs occupy another 35 percent. Finally, a very small area is composed of flooded wetlands.

other expeditions came to the region, the most relevant is the one carried out by Francisco de Orellana. The Spaniard Francisco de Orellana and his group of soldiers in 1541 went down the Amazon River.

The expedition of Francisco de Orellana was the first one to be registered and even documented as well. The monk Gaspar De Carvajal (member of the expedition) describes the facts of the expedition from February 1541 to September 1542 in *"Do Novo Descobrimento do Famoso Rio Grande das Amazonas"*.[44] The expedition was originally organised by Gonzalo Pizarro, brother of Francisco Pizarro the conqueror of Perú. The purpose of the expedition was to find the country of cinnamon, due to the importance of this commodity in trade. Orellana had also been invited on the expedition. Beginning in Quito, they penetrated the region from the Andes, however, after almost one year Orellana had to continue alone in search for food, leaving Pizarro with the majority of the group. Orellana did not find enough supplies, so he decided to carry on with the expedition instead of going back to meet Gonzalo Pizarro. The 26th of August, 1542 Orellana met the Atlantic Ocean, and on the 11th of September, 1542 he reached Venezuela, and from there he travelled to Spain (Esteves, 1993: p.19).

The name of the region resulted from these expeditions, as the conqueror found "tall women warriors." The explorer named them Amazonas, as in the Greek Histories by Herodotus, and their name was given to this area of the continent. These warriors were probably Indian men who were mistaken for women because of their particular dress and long hair. According to the chronicles by Carvajal the river was named Amazonas, and later the whole region connected to it as well. It is important to mention that Carvajal's story has influenced the conception of the Amazon basin as *El Dorado*. This view has been reflected in the many attempts to develop huge projects, as well as in the motivation of national integration and development planning on the Amazon during the current century.[45]

Not only were the Spanish and the Portuguese seduced by the idea of *El Dorado*, but the Dutch made incursions into the Xingu basin, the French into the Tocantins basin, and the British in Amapa and Marajó island. Nevertheless, the Portuguese managed to expel all these incursions through the control of the mouth of the Amazon River. French, English, and Dutch kept a sort of enclave in the northern part of the region which became the Guianas.

The main contenders for control of the Amazon were the Spanish and Portuguese, although some Dutch and English incursions were made and consequently some outposts alongside the rivers were established. The Spanish and Portuguese occupation have as background the treaty of Tordesillas negotiated in 1494 by Pope Alexander VI, that attempted to divided the world between Spain and Portugal. Under this agreement, a demarcation line was drawn 370 leagues west of Cape Verde Islands (Africa). The apparent intention of the Pope was to give Africa and Asia to the Portuguese and America to the Spaniards (Goulding, Smith, and Mahar, 1996: p. 26). According to the treaty, a line was supposed to pass close to the East of the mouth of the Amazon River.

In 1616 the Portuguese, however, in violation of the treaty, built a fort south of the mouth of the Amazon river at what is now known as Belém, capital of the state of Pará. Another fort

[44] This expedition is associated with three myths. First the idea of the existence of a great part of the Amazon inundated by cinnamon. Secondly, the seven cities of gold which were supposed to be in the Amazon, and finally the powerful women warrior named Amazonas as in the Greek Histories by Herodotus.

[45] The idea of "El Dorado" has been developed analytically in different ways by Hemming in *The Search for El Dorado*, Ana Luisa Martins, *Historia dos Garimpos do ouro no Brazil*, and D. Cleary, *Anatomy of the Gold Rush*.

was built in 1669 by the Portuguese at the confluence of the Solimões and Negro River, a place that became known as Manaus. In this way the Portuguese were progressively assuring control over the Amazon. However, it was not until 1750 with the treaty of Madrid that Portuguese domination on the Amazon was formally recognised by Spain.

In summary, the years from 1488 to 1750 can be alluded to as years of exploration and initial colonisation of the Amazon. Thus, small settlements were established along the main rivers, forts were built e.g. Belém in 1616, and several missions took place, especially missionaries from the Society of Jesus.

4.2 Colonial Period. The Pombal strategy

The colonial period is basically marked by Portuguese domination of the Amazon. In this sense the most important factor refers to the impact of the Pombal era on the management of the Amazon. During this colonial period the three main agents were the military, the merchant, and the missionary. In fact, the Portuguese used the military to assure control over the area by building forts as I have already mentioned. In addition, they tried to integrate the region to the crown economy by exploiting some forest products. Finally, they used the missionaries in order to control the labour force (basically Indians).

After 1750 another period in the Amazon history began, basically with the treaty of Madrid, the aim of which was to preserve the area already conquered by Spain and Portugal. Under the principle of *uti possedetis,* Spain granted to Portugal the Amazon up to the mouth of the Madeira River. This period is of primary importance for understanding the current situation in the Amazon, because it marked the beginning of the promotion of an agrarian rural class able to control the social tensions in the region as well as remain faithful to the colonial powers.

To this period belongs the first attempt to "modernise" the Amazon, which was carried out by the Marques of Pombal. The so-called Pomballina era began in 1750 with the appointment by the King of Portugal, José I, of José de Carvalho e Mello, Marquis de Pombal, as secretary of Foreign Affairs and War (Messias, 1995: p.25). This fact brought with it major modifications in Portuguese colonial policy for the Amazon. The strategy designed by Pombal first included taking control of social relations. To do so, he first expelled the Jesuits, and then he appointed lay directors responsible for allocating Amerindian labour to colonist and to colonial authorities. This situation gave origin to the so-called *directorates*. The system of *directorate* made Indian labour available to civil authorities in directorate villages, and they were created clearly to replace Jesuit missions. The second element of his strategy was to promote the economic expansion of the Amazon, using the crown as sponsor. In order to do so, Pombal created the Companhia *Grão Pará e Maranhão*, which was a para-estatal company promoting foreign investment, giving incentives to invest in the Amazon and offering military protection to the investor, especially in the transport of products produced in the region (Messias, 1995: p.25).

One can see then that the idea of economic integration of the Amazon was born with the Pombal project, and in many ways is the same idea developed almost 200 years later by the military governments in Brazil. In fact, the *Superintendencia do Desenvolvimento da Amazonia* (SUDAM) was created during the military government, and could be considered the modern version of the *Companhia Grão Pará e Maranhão*.

After the developmental policy by Pombal (whose effects were felt until the end of the 19th century), the Amazon region fell into stagnation. In fact, the passage of prosperity was short-lived, and was based to a great extent on the *Companhia Grão-Pará e Maranhão* Trade Company, which held the monopoly of shipping, slave trade, and foreign trade. It is important to indicate that under Pombal 's regulations larger consolidated settlements were ruled by appointed lay directors responsible for allocating Amerindian labour, so the *elite* with larger

holdings and more capital were able to monopolise most of the available indigenous labour. In this scenario the new agrarian class as well as the lay directors were the ones taking control over the local economy. On the other hand, inferior settlers without resources or influence to secure access to labour became *comisários volantes* (river traders), later known as *regatões* (Schmink and Wood, 1992: p.40). Since then the Amerindians and the local population became dependent on the *regatões* in terms of the supplying of goods as well as for the commercialisation of their products.

The agrarian class played a substantive role in the development of the social relations in the Amazon by virtue of their own power and their alliance with the foreign capital. Moreover, they reaffirmed their prominent role due to the fact that a national urban bourgeoisie never had an important participation in the Amazon economy, at least until the 1940's.[46] This is understandable if one takes into account the fact that foreigners controlled much of the Amazon trade. At a local level the agrarian class was taking control of the state, and for a long time they shaped the Brazilian Liberal State. In addition, it is important to point out that the middle class never had the real opportunity to have an important political and economic participation due to the oligarchic system imposed by the rural agrarian class.

All the aforementioned historical elements, e.g. the system of directorates, the formation of an agrarian rural class, and the marginal development of the middle class permit us to have a preliminary overview of some of the most important characteristics behind the social situation in the Amazon region.

4.3 The economic boom of the Amazon: The rubber period

Although widespread European contact with the Amazon occurred during the sixteenth and seventeenth centuries, it is not until the late nineteenth century that the scale of exploitation of rubber from the Amazon basin reached significant levels. It can be said that from the middle of the1800s to the end of the Second World War rubber exploitation was the driving force of the Amazonian economy.

The French scientist La Condamine, who visited the region between 1736 and 1742, took information about latex to Europe. However, the *Hevea Brasilensis* was described for the first time in 1762 by the botanist Fausee Aublet (Esteves, 1993: p.43). It is widely accepted that rubber was used for many purposes in the Amazon before the vulcanisation process; for instance, in 1800 Belém exported rubber shoes to England.

Nevertheless, there are two aspects that make the rubber economy dynamic. In the first place there was the introduction of steam-shipping. This fact made the rubber phase possible not only by facilitating and accelerating transportation, but also by making contingents of manpower available for extraction activities. The second factor driving the rubber economy was technological innovation. In 1839 Goodyear discovered how to treat natural latex so that it could maintain its consistency despite changes in temperature. This process was known as vulcanisation, because, like the god Vulcan, it relied on heat brimstone, or sulphur (Schmink and Wood, 1992: p.42).

What is important in order to understand more about the rubber boom is that this activity organised as well as put together much of what already existed, mainly the reminiscences of the Pombal period. The outcome was basically the system of *aviamento*.[47] This system

[46] For example, at the time of the post-Vargas redemocratization in 1946, Brazil was a country of fewer than 48 million inhabitants that was only 36 % urban and had a very limited industry. By 1990 it had become a nation with a population over 150 million that was 75 % urban

[47] The *aviamento* system includes a system of supply, credit, and labour control.

influenced the way the trade system worked in the Amazon, and how economic relations in the Amazon would be conceived in the future. This is based on hierarchy, in personalised forms of patron-client relations, and not in coercion and violence as found in other cases.

Schmink & Wood (1992) explain the different levels of the rubber boom from producer to manufacturer economy. At the bottom of the hierarchy were the rubber tappers (seringueiros) who trekked through their rubber trails (estradas), making a gash in the tree and leaving a cup to collect the milky sap, then returning to collect the latex, and finally smoking it into large balls. Tappers exchanged the smoked rubber at the trading post (barracão) operated either by the local landowner (dono de seringal), or by an individual who paid the owner a commission. Trading post operators paid the tappers in kind, providing them with basic necessities at inflated prices. Nearly all *seringueiros* were in debt to the *barracão*. The owner of the trading post was indebted to a local supplier (aviador) in the nearest town. The latter collected rubber and shipped it to the *aviado*r house in Belém, the central figure in the rubber system. The *aviador* houses then sold the rubber to Belém's based-export houses, usually controlled by foreigners who worked on behalf of rubber buyers. Finally, the overseas purchasing houses sold the rubber to manufacturers across the world (Schmink and Wood, 1992: pp.43-44).

It is interesting to note that the role of the state in the chain of the above mentioned trading system was rather marginal, being limited to the collection of taxes in the harbour of Belém and assuring national sovereignty in terms of the potential threats that foreign companies would have on the national territory. Also notable was the central role of the *aviador,* since he was the one linking the local producer to the rubber buyers, consequently the one linking the local market with the international one. Finally, there was the notorious link between the result of the Pombal's strategy and the organisation of the rubber economy.[48]

The rubber boom collapsed just before World War I. In 1910 it suffered a crash from which it never fully recovered. The origin of the fall of the Amazon rubber economy began when an Englishman, Henry Wickham, arrived in Pará as a botanist carrying out experiments with the plantation of *Hevea brasiliensis*. In 1876 he smuggled rubber tree seeds out on board of a British ship. Once acclimatised in Malaysia and in Sumatra, the new competition brought the Amazon rubber economy to an end, thus its prosperity was short-lived. On a world-wide level, Brazil's share of the production of natural rubber, which was 50 % in 1910 fell to a little over 5 % by 1926 (Messias, 1995: p.27).

From that experience one can point out that the collapse of the rubber economy implied the fall of the Amazon economy as well, mainly for three reasons: First, because this was the main profitable economic activity, not to say the only one. Secondly, this was an activity depending on foreign capital and also foreign markets, so the Amazon economy fell into a situation in which they produced what they could not consume and consumed what they could not produce. Since most investments in the region were foreign they all left, leaving behind economic depression particularly in the states of Amazonas, Pará, and Acre. As a third aspect the *aviamento* system worked against the accumulation of capital and the creation of an internal market that could have stimulated in the Amazon the kind of development which took place in southern Brazil. Especially considering that the system of *aviamento* provided almost no incentive to investment in extractive technology and the profit for the direct producer was nearly null, as was noted above. Therefore, all the profits went to the external market, so there was no possibility to build a strong internal market.

[48] The link can be pointed in two ways. First of all, the system of a*viamento* in many ways begins from the *comissários volantes* during the Pombal period. Secondly, Pombal's system of directorate created a strong dependency of the natives on the local landowner. This was reproduced during the rubber economy, basically in terms of the dependency of the rubber tapper (seringueiros) to the landowner (dono do seringal).

4.4 State intervention and national integration

From the four most important historical events that I mentioned at the introduction of this chapter, the *developmentalism* idea is the most influential one in terms of the research problem treated in this study. For this reason more attention is placed on this historical feature. The core role of the *developmentalism* idea is made evident by its influence on some independent variables used in this study. In fact, a direct link can be attributed between the implementation of such a conception and the outcome of variables such as allocation of resources, environmental change, and population growth. Consequently, its role in explaining social conflicts should not be underestimated.

4.4.1 Getúlio Vargas. The first Brazilian president in the Amazon

The occupation and national integration of the Amazon has been one of the major objectives of Brazilian governments since the 1930s. The recognition of the Brazilian Amazon as an empty space started with president Getúlio Vargas.[49] The first indication that the Brazilian government was planning to open up and occupy the Amazon region appeared in 1940 with Getúlio Vargas. He was the first Brazilian president who travelled throughout the Amazon and with him the *Estado Novo* was established.[50] Vargas supported the approach of "nationalist developmentalism" taking the theoretical justification in the Prebisch position of the United Nations Commission for Latin America (CEPAL), and subsequently in the writings of some Brazilians such as Celso Furtado. These "structuralists" saw the state as the engine of development and argued that the outdated formula of their conservative rivals would condemn the country to perpetual underdevelopment" (Schneider, 1992: p.171).

The clear indication of the aims by President Vargas came with the trip to the Amazon. There he told the Brazilian press:

"I have not come to the Amazon with the outlook of a tourist, who finds here so many reasons for astonishment and for carrying away profound impressions. I have come with the purpose of seeing the practical possibilities of putting into execution a plan for the systematic exploitation of the wealth and the economic development of the great valley" (Cited by Davis Shelton, 1977: p.22).

It is generally recognised that with Vargas the real integration of the Amazon into the rest of Brazil started, along with a state-led development of the Amazonian economy. The most important way to accomplish the above objectives was road construction and economic incentives for investment in the area. The instrument designed to implement the objective was the creation in 1953 of the Superintendency for the Economic Valorisation of the Amazon (SPVEA).

It is also with President Vargas that the idea to reorganise the Amazon space came out. To do so he first formulated the concept of Legal Amazon, a bureaucratic measure to integrate the Amazon into the national economy, as well as a criterion to expand geographically the economic benefits given by SPVEA to the new investors in the Amazon. Thus, the Legal Amazon would include not only the classic Amazon, but part of the states of Mato Grosso, Maranhâo, and Goiás. This new concept was over one-third larger than the classic Amazon,

[49] The defining of the Amazon as an empty space by president Getulio Vargas is done in a speech in Manaus in 1940, when the Amazon was picture as a network of demographic islands connected by rivers running through uninhabited forest.

[50] The *Estado Novo* can be characterised by being highly centralised and authoritarian as well. Moreover, the state would use the powerful institution of patronage to effectively control the organised labour into a system of State tutelage and control.

covering about 60 % of Brazil's territory (Mahar, 1979: p.7).[51] Moreover, Vargas created three new federal territories: Guaporé (currently Rondônia), Rio Branco (currently Roraima), and Amapá.

Under President Vargas and his successor Juscelino Kubitschek, the SPVEA was generally ineffectual, however, through the credit lines it began to have impacts even in remote places in the Amazon. In concrete terms it should be stated that the only goal achieved by SVEA was the construction of the Belém-Brasilia highway (1956-1960), providing the first ground link between Belém (Pará's capital) and the rest of the country. This highway was built with the objective of integrating the Amazon as well as offering a solution to the employment problems in the Northeast.

There were several consequences of opening up the Amazon via highway. First, it facilitated extensive immigration, generating a process of violence and deforestation. Both of them can be related to land claims by virtue of the transformation from public to private lands. Secondly, the highway was instrumental in linking small towns with urban and industrial centres of the country.

The geopolitical concern to populate the Amazon is developed much later under the military regime by General Golbery do Couto e Silva. In his view Brazil needed "to inundate the Amazon forest with civilisation".[52] It should be remembered that one of the basic problems of the Amazon economy was the scarcity of manpower. This was experienced during the Pombal's period as well as during the rubber boom. In that sense, the view of General Golbery in one way responded to this concern. However, at that time there were other important issues such as Brazil's sensitive international borders, and the urgently need to promote immigration and colonisation in those empty spaces.

4.4.2 The military years (1964-85): From Castelo Branco to João Baptista Figueiredo.

Under the philosophy "Amazonia is your best business"

It is notorious that in the last decades the Amazon basin has mistakenly been defined as a huge homogeneous flat region of humid tropical forest, as a demographic vacuum, a world's reserved "*El Dorado*," and as an empty space. Thus, as I have noted since the 1930s most of the programs carried out in the Amazon basin had as starting points the above premises. However, the operationalisation of the ideas of economic growth and national integration find their highest expression during the military years, exemplified by the cases of *Operation Amazônia* (1964); the first Amazonian Development Plan (1972); the second Amazonian Development Plan (1975), which formulated *Polamazonia*; the third Amazonian Development Plan (1980), which includes *Polonoroeste* and the Great Carajás Program (PGC).

The military regime established a clear interrelation between the economic approach to the Amazon basin and the geopolitical one. The generals' basic idea was to link the notion of security (human occupation and extension of territorial control), to the imperatives of economic growth. The strategy of using the state apparatus to promote development and to assure control over the country was a matter of the highest relevance. In 1964 president

[51] The classic Amazon includes Amapá, Acre, Roraima (then Rio Branco), Rondônia (then Guaporè), Amazonas, and Pará.

[52] Cited by Marianne Schmink and Charles Wood (1992), quoting Susana Hecht and Alexander Cockburn (1989).

Castelo Branco stated that "Amazonian occupation would proceed as though it was a strategically conducted war".[53] Thus, the new regime's policy intended that the state would maintain a central role in promoting greater efficiency in the regional planning, yet the military regime added a new element that was needed to improve the role of private enterprises in Amazonian development. The government would provide the infrastructure and funding for economic growth, while entrepreneurs would basically carry out the task of regional development. The main areas sponsored by the military were agriculture, livestock, mining and metallurgy.

In this context the military government established the development agencies dealing with such a process. In this emergent period the two most important institutions were the *Superintendência do Desenvolvimento da Amazôn*ia (SUDAM) that replaced SPVEA, and a regional Development Bank, named the Amazon Bank (BASA). SUDAM was responsible for regional planning and project approval, while the financial part was to be administered by BASA. Since its establishment SUDAM had to report to the Ministry of the Interior, whereas after 1990, it has been attached to the Secretariat for Regional Development. The first of SUDAM's plans was *"Operation Amazônia"*, in which the objectives were oriented toward "establishing development poles, self-sustaining population groups especially in frontier areas, encouraging immigration, providing incentives to private capital, infrastructure development, and research on the potential of natural resources" (Mahar, 1979: p.11).

The economic aspects of *Operation Amazônia* essentially called for a policy of import-substitution industrialisation based on fiscal and credit incentives to private enterprises. Through the implementation of a policy that encouraged private business in the region, *Operation Amazônia* resulted in a legislation that widened the scope of fiscal incentives, meaning that "the government offered fiscal incentives which stipulated that 50 % of a corporation's tax liability could be invested in Amazonian development projects if approved by SUDAM. These tax incentives basically permitted taxes to become venture capital. The taxes could be new ones or expansions of existing enterprises. For enterprises already established in 1996, the law provided them with exemption of 50 % of the taxes owed for 12 years, for projects begun prior to 1972 the tax structure allowed for exemption of up to 100 % (McCleary, 1990: p.12).

In addition, firms were also to be exempt from duties on the export of regional products as well as on the import of machinery and equipment. Moreover, according to Mahar (1979) corporations were allowed an income tax bill when the resulting savings were invested in agriculture, livestock, industry, and basic service activities approved by SUDAM.

The strategy of these years responds to the *developmentalism* idea. The core aspects of the above idea were capital accumulation, extraregional investment, and big economic projects. In this sense Manaus and the Araguaia-Tocantins area were considered basic areas for investment; the former in terms of industry and a new free trade zone, and the latter to encourage cattle ranching. This policy of promoting livestock, industry, and crops responds to a clear attempt to free the Amazon from its historical dependence on extractive commerce.

Concerning the industry and free trade, the constitution of the Superintendency of the Free Zone of Manaus (SUFRAMA), dating back to 1967, allows for the use of a free trade zone mechanisms, the incentives of which are complementary to those provided by SUDAM. The basic aim of the free-zone was to increase employment, thus promoting an importation and exportation zone. As it is indicated by Messias (1995) "tax incentives granted to foreign firms led to the establishment of production lines for all types of consumer goods, from domestic appliances to computers" (Messias, 1995: p.31). The results had not been satisfactory since

[53] Hecht, Susanna (1984) "Cattle Ranching in Amazonia: Political and Ecological Considerations" in Marianne Schmink, and Charles H Wood: *Frontier Expansion in Amazonia*, 1984, p.370.

first the specialised manpower came from the south-east, and secondly the centre of Manaus, where there was a proliferation of urban slums (favelas), was distorted. Presently housing, transport, and food supply are serious problems, the latter aspect is not only due to the increase of urban population, but also a significant collapse in the supply of regional products.

As can be seen *Operation Amazônia* introduced generous fiscal incentives basically through SUDAM and the Amazon Bank (BASA). According to Hall (1997), who quoted Schneider from 1971 to 1987, no less than $US 5.15 billions have been used in incentives and subsidies aimed particularly at large ranchers. Those fiscal incentives have been placed by several authors as the major force behind the phenomenon of deforestation, because it promoted the expansion of cattle ranching, which resulted in environmental degradation. As a consequence of these incentives the land became the main factor of dispute among social actors. That is why I argue that the variable allocation of resources is significant in understanding the frequency and intensity of social conflict in the Amazon.

Concerning livestock, it is appropriate to mention that international leading institutions such as the World Bank made credit available for the Amazon. "Between 1959 and 1973 the World Bank lent Brazil an estimated amount of 839.2 million dollars, plus 1,004 million dollars in counterpart funds, for small-scale livestock projects. The largest allocation of these funds occurred between 1966 and 1970" (McCleary, 1990: p.13). The subsidies to cattle ranching exceeded subsidies to other sectors such as industry and agro-industry in this period. In that sense, while "there were only 4 ranches that received SUDAM incentives in 1966, the number had increased to 162 in 1969" (Hall, 1991: p.7).

The identification of cattle ranching as a key factor with enormous potential comes basically from a study done by the Food and Agriculture Organization (FAO), entitled "*Livestock in Latin America*". This pointed out that Brazil provided the conditions to become a leading export of beef. The World Bank endorsed this report giving a credit line to the sector. In the Amazon the economic advantages of investment in livestock rather than industry were clear. Land was perceived as promising due to the fact that it was plentiful and inexpensive, subject to rapid capital gains, and requiring minimal work-force livestock. On the contrary, the idea of industrial development was hampered by shortages of skilled labour, limited local markets, lack of sufficient credits, and competition from extraregional industry.

The above picture leads us to the assumption that the interrelation between economic growth ideas and security objectives caused an incompatibility between two opposing sets of priorities. On one hand, there was an emphasis on private property, incentives to capital accumulation, and promotion of livestock and agricultural projects. On the other hand, there were the provisions for state intervention to reduce poverty and to make land available to those who worked for it. This contradiction partially explains the so-called land question.

I use the expression "land question" because land reform has been the hottest issue in contemporary Amazon, even during the military years. The military dealt with the land question not by making a land reform, but by allocating plots of land to settlers in the Amazon. This strategy was meant to be the immediate answer to poverty and unemployment in Brazil, above all in the north-east. Among the several misconceptions that stopped land reform during the military years, was the misunderstanding of the basic character of the Amazonian economy, this is its extractive nature, which made it difficult to define property rights in a manner compatible with the standards spelled out in bureaucratic procedures.[54]

[54] It could be argued that the economic history of the Brazilian Amazon has been shaped by extractivism. Thus, forest products (cacao, rubber, and spices) were important since the colonial period. However, extractivism has not been limited to forest products. The extraction of mineral products (gold, diamonds, etc.) has been of great importance especially during the current century. Fishing has also always been an

Second, land property was determined by the so-called *posse*, or effective use, so both large and small holders clear as much as they can to assure the principle of *uti possedetis*. This tradition of land rights based on *posse* rather than on title, comes from the pre-independence period, when small and large producers were permitted to establish legal access to land based on habitual occupation and\or effective cultivation. Third, there was a misallocation of land to small farmers in the sense that most of the Amazonian soils are not suitable for agriculture because of their deficiency in inorganic nutrients such as nitrogen and phosphorus. The final aspect is the fact that in the Amazon basin land seems to be plentiful in comparison with capital and the workforce, which has provoked that the bureaucratic structure tends to use land extensively, due to the fact that is the cheapest factor of production. In summary, the cited contradiction (the one leading to the agrarian question) contributed to social tension and conflicts in the Amazon, thus contributing to the militarisation of the land issue.

4.4.3 Integration and human occupation: "Land without men to men without land"

In a way it could be argued that a second period during the military years was experienced after 1970. Although economic growth still remained an important policy concern in the early 1970s, the goals of human occupation and physical integration became paramount. Instead of the previous slogan "Amazonia is your best business", it now became "*O homen e a meta*", or "Man is the goal".

Among the most important legislation of this era was Decree-law 1106 (June 16, 1970), which established the National Integration Program (PIN). The first Amazonian Development Program in 1972 (PDAM1) was conceived within the nature of PIN, which was part of the first National Development Plan (PND1). According to PND1, the national goals with respect to the Amazon were integration (physical, economic, and cultural), human occupation, and economic development.[55] The National Integration Plan of Amazonian development changed the purely economic focus (at least in theory) to incorporate a social perspective. That is why the emphasis was changed from large-scale farming to small-scale agriculture. With PIN the Institute for Colonisation and Agrarian Reform (INCRA) was created. INCRA was established to assist the PIN in the allocation of lands and incentives for development. The relative changes in policies brought about conflict between INCRA and SUDAM. INCRA which advocated small-scale farmers and SUDAM which still supported corporate development as the best way of developing the Amazon.[56] The strategy of providing free-land to the landless needs to be understood in terms of the growing criticism faced by the military regime and its growth-oriented model accused of increasing rather than decreasing the concentration of income.

One of the most important goals of PIN was to build the Trans-Amazon highway (BR-230), the 5000 Kilometres from Maranhão and Pará in the west to the westernmost state of Acre on the border with Bolivia. The plan supported colonisation of a hundred-hectare plot

---

important activity in the Amazon, and certainly the most important source of protein for the local population.

[55] República Federativa do Brasil, *I Plano Nacional de Desenvolvimento* (PND) 1972-1974 (Rio de Janeiro: Fundação IBGE, Serviço Gráfico, 1971, p.29.

[56] Even though INCRA has been blamed for corruption and for having a rigid structure unable of assisting small farmers.

along both sides of the road. Quoting Domask (1997), the Trans-Amazon program intended to settle 100.000 families along the edges, but ultimately only attracted one-tenth of that amount. The failure of the program has been documented by Smith (1982), Moran (1983) and Fearnside (1984, 1986). In addition to the Trans-Amazon highway, the Cuiabá-Santarém (BR-165) highway is another example of this policy.

It seems to be that the policy of opening up the Amazon and the colonisation process was an escape valve for the population surplus, primarily intended for those from the north-east. One could argue that the opening up of the interior Amazon was not implemented to address the economic and social needs of the region, but mainly to solve the problems facing people from the north-east as well as those from other already overpopulated cities in the south of the country. Nevertheless, the cornerstone of the PIN was a colonisation program (land distribution), and it did not take long before political pressure mounted to abandon the concern for small farmers in favour, once again, of large-scale investment. According to Pompermayer (1984) economic policy was increasingly influenced by the São Paulo based Association of Amazon Entrepreneurs, and with the Second National Development Program (1975-1979) this shift did in fact materialise.

The Second National Plan states that "the indiscriminate migration of poorly educated groups, without capital to invest and using rudimentary technology, only exacerbated problems that already beset the region" (cited by Schmink & Wood, 1992: p.69). A clear example of this shift of strategy can be seen in the new regional development plan called *Polamazonia*. This program launched in 1974 by president Ernesto Geisel, was based on setting fifteen poles of development in the Amazon.[57] In many ways this was not a new program because it represented an extension of the considerations formulated in *Operation Amazônia* (1964). *Polamazonia* worked towards the promotion of large-scale investment such as hydroelectric complexes, mineral research and extraction, agribusiness, and cattle ranching. The government policy in the Amazon once again favoured capital-intensive development over the small farmer. The defeat of the previous colonisation programme was partially the outcome of pressure from corporate cattle interests. As has been explained by Hecht (1985) the ranchers soon learned that extensive ranching, marginally profitable if not subsidised, was the most practical instrument to implant *de facto* ownership and to access fiscal incentives. The change in priorities obviously generated increased conflict over land in the Amazon. Thus, in the Amazon violent incidents arose most frequently between *posseiros* who responded to the government's call for small farmer colonisation and the investors attracted by the profits that could be made by acquiring land with subsidies and fiscal incentives given by SUDAM.

Finally, in 1980 the Third National Development Plan came out (1980-1986). The new president General João Figueiredo basically continued the economic growth policies of his predecessor Geisel, but perhaps with one small difference, General Figueiredo placed primary importance in agriculture. His plan called for the "Gradual occupation and integration of the Amazon region into the national economy based on the non-depredatory exploitation of its natural resources, and respect for the natural environment and indigenous Amerindian population" (McCleary, 1990: p.19). Nevertheless, during his period one of the most environmentally harmful schemes was implemented: The Northwest Brazil Integrated Development Program (Polonoroeste). This has been the largest colonisation scheme in the Amazon, embracing the state of Rondônia and the northern part of Mato Grosso.

[57] The 15 poles of development are the followings: 1-Xingu-Araguaia, 2-Carajás, 3-Araguaia-Tocantins, 4-Trombetas, 5-Altamira, 6-Pre-Amazõnia Maranhense, 7-Rondõnia, 8-Acre, 9-Juruá , 10-Roraima, 11-Tapajós, 12-Amapá, 13-Juruema, 14-Aripuama, 15-Marajó.

Polonoroeste was financed basically by the World Bank and directly focused on small-scale farmers, combining road modernisation and colonisation.[58] The main component of the projects were the establishment of several agricultural areas for settlers, the paving of the BR-364 connecting Cuibá to Portho Velho, and the construction of feeder roads. However, instead of organising the settlement of the region, the project caused an uncontrolled influx of settlers (see table No.2). The program, as stated by Domask (1997), resulted in a ten-fold increase in deforestation in Rondônia, making it the highest rate in all of Brazil at the time. The forest cover in Rondônia shrank to approximately 76 % by 1988. In this way, *Polanoroeste* contributed to increasing the chaotic situation, illustrated by migration intensity, deforestation, land speculation and violence.

Table 2: Migrants arriving in Vilhena, Rondônia (1980-87)

Year	1980	1981	1982	1983	1984	1985	1986	1987
Number	28.320	30.072	48.851	92.723	153.327	151.621	165.899	103.654

Source: Governo do Estado de Rondônia, SEPLAN (1987) Estudo socio-economic de Populações Assentadas nos Projetos de Colonização do Estado de Rondônia. [59]

In conclusion, the development that took place during the military years indicate that some of the perceptions from the years of discovery and from the Pombal era were still prevalent. The perception of the Amazon as an enormous empty space seldom exploited and the idea of the richness of the area in many ways gave origin to the different development programs in the basin. Of course these notions were later combined with new situations such as the growing poverty in the north-east of Brazil as well as the Brazilian need to produce goods for the international market. The above situation explained the main features of the military years and why the promotion of large-scale investment incorporated ambitious programmes of colonisation by small farmers. Ultimately, both processes have contributed to an unlimited exploitation of natural resources in the Amazon basin and the instigation of social stress.

4.5 Concluding remarks

It is evident that the history of the Amazon has been greatly influenced by two ideas: by the myth of the Amazon as a rich space to be exploited, and secondly, the *developmentalism* paradigm. Both ideas have as a common factor to be based in the imperative of economic exploitation of the Amazon region.

The myth of *El Dorado* (the fabulously rich Indian ruler), took not only the conquistador Gonzalo Pizarro and Francisco de Orellana across the Andes into the Amazon, but also many other explorers. Although the kingdom of *El Dorado* was never found, the myth not only promoted the discovery of the Amazon River, and the exploration of the basin (search for

[58] Funded at an estimated cost of 1.5 billion dollars by the World Bank, *Polanoroeste* was supposed to improve the physical and social infrastructure of the settlers. However, the results were chaotic. The huge number of migrants strained the administrative capacities as well as exceeded the carrying capacity of the area. In addition, the environmental transformation of the area was notable. The paving of the BR-364, the construction of feeder corridors and access roads accelerated deforestation and soil erosion in the area.

[59] Cited by George Martine "Rondônia and the Fate of Small Producers", in David Goodman & Anthony Hall (eds.): *The Future of Amazônia: Destruction or Sustainable Development*, 1990, p.30.

cinnamon and gold), but also has promoted public and private investment. As a result, the Amazon has experienced a long history of activities related basically to extraction, colonisation, and implementation of mega-projects.

The *developmentalism* paradigm constitutes the second most important event in the historical development of the Amazon. In a way one can state that the first manifestation of this idea is found in Pombal's strategy to develop the Amazon, and the creation of the company Grão Pará-Maranhão is an example of such a philosophy. However, the contemporary operationalisation of the idea started in 1953 with President Vargas through the creation of the "Superintendency for the Valorisation of the Amazon" (SPVEA). The full implementation of such a conception was carried out during the military period beginning with *Operation Amazônia* (1964) and using as its main instrument the *Superintêndencia do Desenvolvimento da Amazônia* (SUDAM).

Upon final evaluation of the *developmentalism* strategy, one can see that the model did generate economic growth, as reflected in the 9.5 % of economic growth per year as an average over three decades as well as an increase in the national participation of the Amazon economy (Messias, 1995: p.3). Despite the above fact, most of the profits generated were not re-invested in the Amazon. Therefore, most of the population did not see any real improvement in their socio-economic conditions. In addition, the numbers have to be counterbalanced with the loss of approximately 10 % of the forest cover, the pollution of rivers, and the spread of diseases, a product of unplanned mega-projects. In short, despite of the relative improvement in macro-economic terms, there was little regard for questions related to equity, distribution, social costs, and impacts on environmental ecosystem.

CHAPTER V. NATIONAL-INTERNATIONAL INTERACTIONS AND INTERNAL ATTRIBUTES OF THE BRAZILIAN AMAZON

Objective of this chapter

This chapter attempts to apply the systemic perspective to the Brazilian Amazon. The systemic perspective in this chapter is used to facilitate the multilevel and multidisciplinary study of the Brazilian Amazon. Therefore, it is the aim first to present the interactions between the Brazilian Amazon and its suprasystem. The second objective of this chapter is to show the main internal attributes of the Brazilian Amazon. These attributes will be presented under the general categories of environmental change, state performance, and social dynamics.

The division of this chapter in the above two objectives is not a casual one. On the contrary this responds to the way I understand the configuration of the research problem. That means that the discussion of the links between environment, security, and conflicts can not only be understood from the standpoint of a pure international approach (externally oriented) or through the bureaucratic approach (internally oriented). Thus, the problem is better understood by looking at the permanent interaction between system and suprasystem factors, after all the Brazilian Amazon is an open system. In particular the use of the macro-perspective will allow us to note how the variable environmental change has been directly influenced by the system-suprasystem interactions.

What is the importance of this chapter in fulfilling the objectives of this dissertation? The basic aspect is that by accomplishing what I stated in the previous two paragraphs I will be able first to relate the system-suprasystem interactions to the security issue. Then, I can explain how environmental matters have been related to security issues in the Brazilian

Amazon. It should be remembered that an important background of this dissertation was the environment and security approach presented in part A chapter II. Secondly, I will be able to link the system-suprasystem interactions to the dynamics of social conflicts in the Brazilian Amazon. In fact, this chapter will allow us to see how the "outcome" of variables such as environmental change, allocation of resources, land distribution, population growth, and the legal system respond to certain extent to the system-suprasystem dynamics. In short, this chapter provides the background for understanding the environment and security discussion as well as the relationship between environment and conflicts in the Brazilian Amazon.

5.1 Analysing interactions between the Brazilian Amazon and its suprasystem

I attempt to achieve the first objective of this chapter first by presenting how the multilateral institution, the neighbouring countries, the industrialised countries, and national-international NGOs have influenced the internal attributes of the Brazilian Amazon. Secondly, by showing the Brazilian response to these inputs during the governments of José Sarney, Collor de Mello, Itamar Franco, and Fernando Henrique Cardoso. Finally, by analysing how the system-suprasystem interactions have shaped the links between environmental and security matters in the Brazilian Amazon.

5.1.1 The Brazilian Amazon and the Multilateral Institutions

The last years of the 1980s and the beginning of the 1990s lead to some important changes in the way agents look at the environment. Before the 1980s in many countries including Brazil the Conventional Wisdom was industrialisation and modernisation of the economies. The international community designed institutions aiming to help countries in this task. Among the most important ones were the multilateral institutions such as the World Bank and the International Monetary Fund. Nevertheless, at the end of the 1980s and beginning of the 1990s a progressive change in this paradigm started to be adopted. The Brazilian Amazon reflected such changes.

As I showed in the previous chapter (IV) the Amazon has been characterised since its discovery by an externally oriented model. The Pombal period, the rubber boom, and the *developmentalism* strategy are examples. In the latest case during the military period starting in 1964 strong links were established with foreign capital. The Brazilian market was open to public and private enterprises and the Brazilian government began to borrow enormous amounts of dollars from the lending institutions. In the case of the Amazon all sorts of economic incentives were implemented in addition. A paramount role was played by the multilateral institutions especially the World Bank and the Interamerican Development Bank (IDB). These institutions financed mega-projects such as the Trans-Amazon highway, the *Polonoroeste* Program, The Greater Carajás Program and hydroelectric projects.[60] As can be seen very much in the line of the Conventional Wisdom paradigm of industrialisation and modernisation. These programs provoked heavy migration into the Amazon, invasion of Indian land and a high rate of deforestation.

However, in the second part of the 1980s the operating principles of these multilateral institutions started to shift from rapid industrialisation and modernisation to a policy more in

[60] The World Bank helped fund the 5.000 kilometres Trans-Amazon highway. In the case of *Polonoroeste* the World Bank provided $350 million to pave the 1.000 mile segment of the highway through Rondônia and Mato Grosso. In Hydroelectric projects the World Bank approved in 1986 a $500 million power sector loan to Eletróbas (Brazilian state electricity company). Finally, in the case of Greater Carajás Program the World Bank approved $300 million to fund part of the program.

correspondence with the paradigm of sustainable development. As pointed out by Domask (1997) the establishment of the Environment Department in 1987 under president Conable was a milestone among the World Bank's initiatives to incorporate environmental considerations into their policies. Prior to this restructuring there were only six staff members evaluating environmental aspects of Bank lending, by 1990 the staff had increased to nearly 100 and by 1996 there were nearly 300 individuals. In the same way an environmental division was created in 1990 in the Interamerican Development Bank. Examples of these changes are found in 1986 when the US World Bank executive director was opposed a loan on environmental grounds for the first time, because of the possible effects on the Amazon of a US$ 500 million loan to the energy sector in Brazil. In the same way the IDB suspended a loan to asphalt the BR-364 to Rio Branco in 1987. These changes I argue have important effects in the Brazilian Amazon policy.

In the case of the Brazilian Amazon the World Bank has been more active for better and for worse than the Interamerican Development Bank. The IDB has mainly concentrated on environmental problems in urban areas. According to Domask (1997) between 1987 and 1994 the World Bank alone had approved US$ 3.3 billion for environmental projects in Brazil. The major loans include *Planafloro* (Rondônia Natural Resources Management Project), as well as the National Environmental Plan in 1990. As a result of the latter Brazil became one of the first countries to get a free-standing environmental loan, for which no economic rate of returns is required.

What is interesting to note is that some of the lending by the World Bank is clearly allocated to repair the damages for projects financed by the Bank in the past. One example is the case of *Planofloro*. The purpose of this is to correct the environmental disruption caused by *Polonoroeste.* In the same way the expected loan of US$50 million for Environmental Conservation and Rehabilitation Project, which attempts to help CVRD to improve its industrial and mining control. In that sense, it was as a result of the World Bank's involvement in *Polonoroeste* that the former Bank's president, Barber Conable made a public statement in 1987 that the Bank had not sufficiently addressed environmental concerns in the past loan agreements (Cleary, 1991: p.90). Thus, in the Amazon the World Bank began in the 1990s as it did in the 1980s, lending money. Nevertheless the philosophy behind the lending is different. Contrary to the 1980s, in the 1990s environmental considerations rank high in the lending policy for Amazonian development. In short, multilateral institutions have played an important role in the internal dynamic of the Brazilian Amazon and it is expected that they will continue to play a substantive role in Amazonian policy.

5.1.2 The Brazilian Amazon and neighbouring countries

The inputs coming from neighbouring countries are different from those from the multilateral institutions, in the sense that they are not aiming to push Brazil into one specific set of policies related to the Amazon environment. The reasons are due to the prominent role that Brazil plays in the regional context as well as the financial limitations of the other countries. On the contrary the neighbouring countries have normally responded to the Brazilian call to face international pressure. A clear example is the declaration of Manaus (1989) in which Brazil tried to strengthen its sovereign capacities through a joint declaration with the other Amazonian countries.

Relationships between Brazil and the other Amazonian countries have been marked at formal level by two instruments, the Treaty for Amazonian Cooperation and the Programs for Border Development and Integration in the Amazon Region. The Treaty for Amazonian Cooperation was signed in Brasilia (July 3, 1978) by the foreign ministers of the eight Amazonian countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Surinam, and Venezuela. It was ratified by all the countries and entered into effect on August 3, 1980. In

relation to the area of application of the treaty, it is not confined exclusively to the area of the Amazon basin (see table No.3). Since the basin is defined as the area drained by rivers flowing towards a common outlet to the sea. Instead of this principle the treaty includes territories which, by virtue of geographical, ecological, or economic characteristics are considered closely connected with the Amazon basin (Medina, 1980: p.63). As can be seen political criteria played a substantial role. That is why Surinam is part of the agreement and French Guyana was left out of the treaty. [61]

Table 3: Amazon countries according to the Treaty for Amazonian Cooperation

Country	Basin km2	National %	Basin %
Bolivia	824.000	75. 0 %	11.20 %
Brazil	4.982.000	58.50 %	67.79 %
Colombia	406.000	36.0 %	5.52 %
Ecuador	123.000	2.73 %	1.67 %
Guyana	5.870	2.73 %	0.08 %
Peru	956.751	74.44 %	13.02 %
Venezuela	53.000	5.78 %	0.72 %
Surinan	142.800	100.0 %	----

Source: TCA\BID\PNUD. 1992

****** Although Surinam is part of the mechanisms of Amazonian integration. This cannot be fully integrated in the basin.

There are two principles within the Treaty for Amazonian Cooperation of particular importance. First, a basic principle is found in article V, which reaffirms the sovereign right of each state to the exclusive utilisation of natural resources within its territory, the exercise of such rights to be unfettered by any restrictions other than those arising from international law. Second article III sets out the principle of freedom of international commercial navigation on the Amazon River, except cabotage. This is more than a principle and perhaps the only article that imposes a specific obligation on the signatories. Additionally, articles V and VI deal with this topic; the latter states the idea of "...enabling the Amazonian rivers to become an effective communication link between the contracting parties and the Atlantic Ocean." (Landau, 1980: p.481). As I said, the Amazonian Pact as it is known was reflected in the Manaus declaration. In 1989 the presidents gathered in Manaus and reaffirmed national sovereignties over the Amazon basin, and linked a change in environmental policies to concessions on international debt. This last aspect will be discussed below.

The other most important mechanism of relation between Brazil and the other Amazon countries have been the Programs for Border Development and Integration in the Amazon Region. These programs are related with the Treaty for Amazonian Cooperation through the

[61] The definition is based on political rather than scientific criteria. First, the incorporation of Suriname was seen as a good element to strengthen the international position with one more country in this Latin American block. Secondly, French Guyana, was excluded clearly belonging to the basin because it is reached by some affluent of the Amazon River. Certainly its dependent status from France worked against its incorporation.

utilisation of the treaty as a framework for bilateral co-operation. A summary of these bilateral projects are presented here:

Bilateral Program Ecuador-Colombia

The government of Ecuador and Colombia issued the declaration of Rumichaca in February 1985. On the basis of this instrument, they approved the terms of reference for the Physical Planning and Management of the San Miguel and Putumayo River Basins. It includes part of the department of Putumayo in Colombia and the province of Sucumbíos and part of the Napo province in Ecuador.

Bilateral program Colombia-Peru

In 1987 the countries agreed to adopt an action plan on Amazonian co-operation, as result the Plan for Integral Development of the Putumayo River Basin was approved. It includes the department of Putumayo and Amazonas in Colombia, and part of the provinces of Maynas and Ramón Castilla in Perú.

Bilateral program Brazil-Colombia

In 1987 these countries approved the preparation of the Colombian-Brazilian model plan for the integrated development of the border communities in the Tabatinga-Apaporis axis. The towns of Leticia in Colombia and Tabatinga in Brazil are the economic centres of the region.

Bilateral program Brazil-Peru

In July 1987 were signed the declaration of Rio Branco, and the Puerto Maldonado Action Program. Thus, the joint Brazilian-Peruvian commission on Amazonian Co-operation was established to carry out studies of common interest. As a result it was decided to implement the integrated development program for the Peruvian-Brazilian Border Communities. The Brazilian area includes the south-east state of Acre, and the Peruvian one, the Inka region in the province of Tahuamani.

Bilateral program Bolivia-Brazil

In 1988 the presidents of both countries issued a declaration stressing the need for constant attention to environmental issues in the Amazon region. Thus, a plan was initiated in the micro-regions of Brasiléia-Cobija; Guajaramirim-Guayaramerín; and Costa Marques and the San Joaquín, San Ramon and Magdalena triangle.

In summary, all these formal agreements have been established to ensure more control over the Amazon. The idea of economic development, settlement areas, and conservation strategies have to be understood within a strategy of effective occupation of the Amazon linked to overall notions of security.

5.1.3 The Brazilian Amazon and Industrialised countries

The relationship with The United States has traditionally been a keystone of Brazilian policy. The United States has played a significant indirect role due to its powerful influence in the main multilateral institution affecting Amazonian policy, basically the World Bank. In addition, a more direct role is played due to the important environmental lobby in USA as well as the participation of the U.S.A in mechanisms directly linked to financing Amazonian conservation such as the PP- G7 program.

In the late 1980s, the issue of intervention into national sovereign affairs heightened as a result of The United States chastisement of Brazil's environmental policies in the Amazon along with the role played by US senators in cancelling World Bank and IDB funds (Domask, 1997). The above situation provoked a deterioration of relationships between The United States and Brazil. Under these circumstances, in 1989 the U.S.A took some steps to improve the relationship sending four senators to Brazil, including current vice-president Al Gore to attend a session of a committee of Brazil's National Congress to appease the Brazilian nationalist sentiment over the Amazon. Relations with the United States faced a difficult period during Sarney's administration, however once Collor de Mello came to office a more positive atmosphere started to emerge.

The relationship with Germany in terms of the Amazon has also been important. The reason explaining the German importance is not only because Germany is the most important European trade partner, but in addition as mentioned by Cleary (1991) this arises from the large German community in Brazil as well as from the fact that no European country has played a more important role in Amazonian research than Germany. Moreover, it has to be said that former German Chancellor Helmut Kohl took a strong personal interest in the Brazilian Amazon. In fact, he ensured that the Amazon was discussed in the G-7 summit in 1990. As a result of this the PP-G7 program was launched and is now over 90 % financed by the EU, but most of this from Germany. Following Kolk (1998) the participation of German NGOs has been particularly strong, so in 1989 more than one hundred NGOs signed a rainforest memorandum expressing concern over the process of environmental change in Brazil. The subject of such memorandum was discussed later by the German parliament (Deutscher Bundestag). Criticism of multilateral lending in the Amazon has been especially strong in Germany. As indicated by Cleary (1991) involvement of the EU and German Banks in financing Carajás has been fiercely criticised in Germany, and it is inevitable that future German lending will be more closely scrutinised for environmental impacts than in the past.

Finally, a recent example of Brazilian Amazon relations with Germany is found in the German response to the passing of the decree 1775 in the current government of Fernando H. Cardoso. Thus, in 1996 Brazil was threatened with the possibility of having millions of dollars suspended. Because the passing of the decree 1775, which threatened the demarcation of existing Indian land in the Amazon. As a result the German Parliament' s International Co-operation Commission issued a resolution to the Brazilian government calling for no reductions in previously demarcated Indian land. In short, there are long-established, technical and financial links between Germany and the Amazon, so the German involvement in the Amazon can be expected to continue.

5.1.4 NGOs and other international forces

Finally, the substantial role played by NGOs in the Brazilian Amazon cannot be forgotten. These agents have been particularly relevant in the case of Indian policy. Several examples of actions in the Amazon can be cited, among the most relevant are pressures for the demarcation of Yanomani land. Here Survival International mounted its largest campaign to date in 1989 to press for the restoration of the old reserve. Within Brazil a newly created Commission for the Creation of the Yanomani Park (CCPY) attracted cross-party support in congress. Another example is found in the assistance to the Kaiapó and other tribes in the opposition to the dams to be built on the Xingú River. This process finished in a well-recorded event in 1989 called the Altamira Congress.

In general through the 1980s several local organisations in the Amazon were formed. Those organisations find support with stronger International NGOs. Among the most important ones constituted in the 1980s are The Union of Indigenous People (UNI), the National Rubber Tapper Council (CNS), the National Confederation of Agricultural Workers

(CONTAG), and the Alliance of Forest People (APF), an organisation made of Indians and rubber tappers.

A case in point showing the importance of these agents in terms of system-suprasystem interactions is found in the Rubber Tapper Council. From 1985 they undertook a campaign for the creation of extractive reserves in areas long colonised by rubber tappers. Under the leadership of Chico Mendes they got a lot of attention in the international media. In 1987 Mendes was catapulted to international prominence as a spokesman for communities affected by highway construction. Mendes was brought to the United States in 1987 by a number of USA environmental groups to put the case against the paving of the highway from Portho Velho to Rio Branco (BR-364). As a result of meetings with executive directors of the IDB and politicians in Washington, the IDB suspended disbursement of the loan, the highway being halted (Cleary, 1991: p.32). In 1988 he was shot dead by ranchers in the state of Acre. This episode put even more pressure on the Brazilian government.

5.2 The Brazilian Response: An evaluation of system outputs

As can be noted from the previous exposition, the Brazilian Amazon was an object of intense debate especially since the 1980s. Such a situation put the Brazilian Amazon under constant influxes from the suprasystem. The response to such inputs is what I will try to summarise in the following paragraphs. At a general level it can be argued that an evolution from national integration to national sovereignty, and from this to international co-operation is experienced. As I will show however, these three dimensions are still alive in the conceptualisation of the Amazon by the Brazilian authorities.

5.2.1 José Sarney: Between national sovereignty and international dependency

The first civilian since 1964 to occupy the presidency was José Sarney who faced great pressure from the international community. The political strategy of president Sarney was to keep the international community from interfering in the domestic affairs of Brazil while trying to retain the external sources of funding.

It cannot be argued that Sarney administration did not try to cope with the international pressure by making some environmental efforts. For instance during that period a temporary suspension was placed on fiscal incentives for cattle ranching. Moreover, Law No.7.804 provided for the creation of extractive reserves. At Institutional level the creation of the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) took place under the Interior Ministry in 1989. Finally, a new constitution was passed which includes a whole chapter (VI) on the environment. Nevertheless, despite all these measures Fearnside argues (1990) that 35 % of the deforestation that had occurred in the Amazon took place during the Sarney administration. However, the most important response to the international community is found in the formulation of the Program for the Defence of the Ecosystem Complex of the Legal Amazon, known as *Nossa Natureza.*

The full name of this program is *"Programa de Defensa do Complexo do Ecossistema da Amazonia Legal"*, outlined in decree No.96.944 (12th October 1988). It includes 49 environmental decrees, covering a variety of projects such as the establishment of national parks, natural reserves and so on. The name *our nature* suggests that Brazil was entitled to exercise internal sovereignty over the Amazon, which shows the strong influence of considerations of national sovereignty on environmental policies. The program addressed six basic issue areas, namely forest protection, chemical pollution from mining, the structure of the system of environmental protection, environmental education, research, and the division of the Amazon between protection areas, indigenous areas, and extractive areas (Costa, 1992: p. 433). An interesting point showing the prominent role of the military is that the working

group was co-ordinated by an interministerial commission led by the institutional successor of the National Security Council, headed by general Rubens Bayma Denys, also in charge of the *Calha Norte* project. As mentioned by Santilli (1989) the launching of the programme also has repercussions on the diplomatic front. The Brazilian government mobilised the members of the Treaty of Amazonian Cooperation, which resulted in the March 1989 declaration of Quito, and the declaration of Manaus already mentioned.

5.2.2 Collor the Mello: Turning the Amazon into a political tool

Fernando Collor de Mello was the first civilian elected by popular vote to the presidency of Brazil in 29 years. The most remarkable feature is that he turned the Brazilian Amazon into a political and economic tool to negotiate with international agents. He achieved that through a set of measures aiming at showing to the International community a real Brazilian effort in managing the Amazon in a sustainable manner. However, in his actions there is a clear message that developed countries would have to share the costs of preservation.

One of the first steps taken by Collor was to bring important figures linked to the Brazilian environmental movement into the government. Two particular names were relevant, Helio Setti and José Lutzenberger a world-renowned environmentalist. Helio Setti was called to elaborate a plan for the first 10, 100, and 1000 days of government. The result was "*Proposal and Directives for the Environment*".[62] According to Cleary (1991) all the recommendations for the first 10 and 100 days were implemented including the creation of SEMA, a new Environment Secretariat with the status of ministry. To lead SEMA president Colllor appointed Brazil' s most distinguished environmentalist, José Lutzenberger.

In environmental circles in Brazil and abroad the appointment of Lutzenberger was welcome above all because he had been opposed to mega-projects in the Amazon such as road building and large hydroelectric projects. As a result of all these changes the World Bank loaned US$117 million in March 1990 toward the US$166.4 million estimated as the total implementation costs of the government environmental programme (Cleary, 1991: p.68).

During the Collor government the secretariat for the environment (SEMA) was elevated to the cabinet level, he banned the export of unprocessed hardwood logs, the paving of the BR-364 was temporarily suspended, he established five extractive reserves and approved in November 1991 the demarcation of the Yanomani land. In addition, he formulated a strong policy to avoid *garimpeiro* invasions in Indian lands. Most of the above deceptions have to be understood in the context of the external conditions, mainly due to the celebration of the Earth Summit in Rio de Janeiro, 1992. These measures were taken to demonstrate to the international community the new Brazilian policies towards the environment. Even though it is difficult to argue that the above measures had a fast direct impact on reducing Amazonian deforestation it is interesting to note that according to statistics by INPE, deforestation decreased in the period 1990-91 in comparison with 1988-90. For instance according to INPE estimations (1998) the annual rate of deforestation in percent during the period 1987-1989 was 0,48 % for the legal Amazon, while during the period 1990-92 it was around 0,33 %. All the above change took place just before the Earth Summit in Rio de Janeiro. In general terms Collor seemed to pursue a quite different strategy in comparison with Sarney. Collor used the Amazon to gain international leadership, while Sarney as is well presented by Kasa (1994) adopted the position in which the Amazon was a non-negotiable question.

[62] In the foreword of this document it is stated that if Brazil does not confront, internally and externally, the problems linked to the environmental question, it will endanger both the economic programme and the international relations.

5.2.3 Itamar Franco. The unexpected president

In October 1992 Collor himself was removed from office due to discoveries of corruption. Because of this vice-president Itamar Franco finished the period. As pointed out by Domask, having five of nine cabinet positions filled by military officers, Franco was less sensitive to the environment and improving international relations than Collor. However, Franco did not attempt to counter the main lines of environmental policy under the Collor administration. One of the most important actions taken by Franco was to put the conflicting agencies of SEMA and IBAMA under the jurisdiction of the new Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal. In addition, under Franco's government the first debt-for nature swap highly criticised by Sarney was approved. Quoting Domask (1997) the Nature Conservancy used US$850,000 to buy US$2.2 million in Brazilian debt to fund the Grande Sertâo Veredas national park.

5.2.4 Fernando H. Cardoso. An international environmental cooperative approach

Up to now it can be argued that in the government of Fernando H. Cardoso the priority has not been the environment, but economic liberalisation, stabilisation, and regional integration. However, he has taken a cooperative approach in relation to the Amazon as well as he has been clearly pro-environment at least at a rhetorical level. In general terms president Cardoso has succeeded in bringing inflation under control since he introduced the *Plano Real* as finance minister in 1994. This fact as well as his open recognition of the importance of sustainable management of the Amazon has been important in approaching lending institutions. The best example of this cooperative approach is the participation in the G-7 Pilot Program to conserve the Brazilian Rainforest PP-G7. This is a comprehensive and long term environmental program developed in conjunction by Brazil, the European Union and the G-7 governments. Unlike traditional bank lending, the Pilot program is not funded through loans but through grants. According to the World Bank (1995), the broader thematic goals of the overall project are the following: to demonstrate the feasibility of harmonising economic and environmental objectives in tropical rainforest, to help preserve the huge genetic resources of the rain forest, to reduce carbon emissions, and to provide another example of co-operation between developed and developing countries on global environmental issues.[63] The main activities of the program have been related to the protection of indigenous lands, to support extractive reserves, and the management of forest resources.

Among the most important measures taken by his administration is the launching of the *Green Protocol* in November 1995. The new protocol for instance prohibits the five federal banks from financing any projects without assessing their environmental impacts. Moreover, Cardoso announced the launching of his *Amazon Initiative* in April 1995 to reassure the lending government (G-7 countries) that the money sent to Brazil was being used to protect

[63] The components of the PP-G7 are the following:
1. NGO Demonstration Projects
2. Science Centers and Directed Research
3. Extractive Reserves
4. Natural Resources Policy
5. Indigenous Lands
6. National Forest
7. Environmental Education
8. Natural Resources Management
9. Rehabilitation of Degraded Areas
10. Parks and Reserves

the Amazon. The largest component of the program is the demarcation of 58 Indian reserves. In addition, under a program called *Legal Amazon Environmental Protocol* in 1996 an important measure was taken. The exploitation of Mahogany and Virola was suspended. These two tropical trees are of great value in the international market and they have been severely depleted in the Amazon in the last years.

Finally, in February 1998 came the *Environmental Crimes Law* (Law No.9505) which was considered by some as the greatest environmental advance in the 1990s. The law sets downs fines of up to US$50 million and jail sentences for crimes ranging from illegal logging and killing of wild animals, to industrial pollution. Previously the penalties for environmental offences were not laid down by law, making it easy for companies to appeal in the courts and avoid punishment. However, the executive order number 1.170 in August 1998 established that companies that violated environmental legislation can sign a letter of commitment with an environmental agency by December 31st, promising to bring their operation into compliance and be exempted from penalties for up to five years. This last point has been highly criticised by environmental groups in Brazil and abroad.

Nevertheless the positive efforts to meet national-international demands, there is one aspect in which Cardoso' s administration has been under great international pressure. That is the issue of decree 1775 (January 1996). I have already mentioned the German position around this decree. Decree 1775 gave states, counties, and private claimants the rights to contest and potentially reduce the boundaries of previously demarcated Indian land. The issue of this decree has been understood as an open door to reduce and invade indigenous land by other land contenders.

5.3 Placing the Brazilian Amazon within an environment and security framework

The Brazilian Amazon shows that governments can be subjected to intense influence from the suprasystem. The influx from the international sphere on the Brazilian Amazon has shown to be of great relevance influencing the environmental variable both in positive and negative terms. In addition, the Brazilian Amazon case shows that there has been an important response by the system. The outputs have been articulated in assuring Brazilian sovereignty on the Amazon, but accepting the importance of some global environmental standards as well as the importance of international co-operation. However, as I said the above acceptance is framed in terms of the rights and responsibilities of states, underscoring the principle of national sovereignty and national security in the management of the Amazon basin. The above criterion certainly establishes the most important links between the notion of environmental management and the conception of security in the Brazilian Amazon.

5.3.1 Does it make sense to speak of sovereignty in the Brazilian Amazon?

The answer to this question is part of the background leading the discussion of the management of the Amazon. José Sarney declared in 1989 "the Amazon is ours", in a statement titled *"Our nature"*. After all, Sarney continues "it is situated in our territory".[64] That was a clear expression of sovereignty (see chapter II, section 2.1 for links between sovereignty and security).

[64] This statement appears in the Washington Post in an article entitled *"Brazil angrily unveils plans for the Amazon*, April 7, 1989.

Several actors, especially NGOs, have challenged Brazilian sovereignty over the Amazon rainforest on the ecological grounds that the importance of the Amazon extends far beyond the territory of Brazil. The argument is based on the fact that the Amazon rainforest flows across the borderlines of the sovereign territorial space of Brazil. It should be remembered that the Amazon is shared by nine nation-states. In that sense, the question here is that fixed territorial space in political terms does not always coincide with the territoriality of the ecosystems, which slice across geopolitical boundaries. Therefore, sovereignty conceived in its traditional way as rule over a fixed-static territory becomes problematic.

The conception of the Brazilian Amazon as an open system which, is dynamic to a certain extent, is determined by the relationship system-suprasystem shows that in the environmental arena sovereignty no longer serves merely as the source of every state's freedom to manage natural resources in the way they please without caring for international standards. As Keohane points out, sovereignty no longer enables states to exert effective supremacy over what occurs within their territories. Rather than connoting the exercise of supremacy within a given territory, sovereignty provides the state with a legal grip on an aspect of a transnational process, whether involving multinational investment, the world's ecology, drug dealers etc. Thus, sovereignty is less a territorially defined barrier than a bargaining resource for politics characterised by complex transnational network (Keohane, 1995: pp.176-77).[65]

5.3.2 Why are the military so preoccupied with the Amazon?

The preoccupation has two angles. The first one refers to the nature of the physical space, and the second is related to the international valuation of that physical space. Both of them are different, but interrelated. In the first case the length of the borders of the Brazilian Amazon, which have traditionally been viewed as vulnerable, determine the worries. No wonder, from Oiapoque, extreme north of the country, to Chui, in the extreme south, the land frontier stretches along 16.500 km. The Amazonian region is countered by a line of frontiers of 10.948 km, four times the distance from Madrid to S. Petersburg and the equivalent of approximately 70 % of the total extension of Brazil's international border (Dreifuss, 1998: p.15).[66] Moreover, the extension of the borders is accompanied by factors such as low population density, poor communications, as well as of being a sensitive area due to mineral

[65] Conca (1994) summarises at theoretical level the arguments of the sovereignty discussion by arguing that there are two perspectives dominating the debate. The first one argues that there is erosion and weakening of sovereignty. This perspective is sometimes tied to the view that sovereignty and ecology are inherently at odds. Because ecosystem and environmental processes do not respect state borders, sovereignty itself becomes a key institution of global-scale environmental destruction. The second claims that international processes, and in particular, the emergence of multilateral institutions for environmental protection, do not inevitably erode state sovereignty and may even strengthen it. By placing states at the centre of institutional responses and strengthening their capacity to act collectively, it is argued, the menu of choices available to states is being expanded not restricted (Conca, 1994: p.702). For example Levy, Keohane and Hass (1993) have argued that, although environmental regimes may limit the scope of governments to act unilaterally, they also facilitate collective state-based problem solving. It is perfectly plausible that both things have occurred. Thus, at the same time that the scope of the state autonomy is being narrowed, the problem solving capacity of states is increasing. Consider for instance transboundary pollution: International mechanism to control it could erode the sovereign right to exclusive territorial jurisdiction, but at the same time strengthen aspects of the principle of non-intervention, if the flows themselves are viewed as unjustified interventions.

[66] For example, the frontier with French Guyana is 730 km long, with Venezuela Guyana and Surinam is 3.649 Km, with Colombia is 1.644, and with Perú 2.995 km.

resources. All these factors make the Brazilian Amazon a very vulnerable area in the eyes of the military.

The second line of preoccupation is evident in the constant reaffirmation of Brazilian territorial integrity, unity and sovereignty. These concepts have a special meaning when it comes to the Amazonian region. As indicated by Dreifuss (1998), this is not a new phenomenon. Over the past 180 years international agencies, countries and individuals have intervened in the management of the Brazilian Amazon. In 1989 Al Gore was quoted as saying, "contrary to what Brazilians think, the Amazon is not theirs, but belong to all of us. Francois Mitterand declared that Brazil needs to accept a "relative sovereignty" over the Amazon. In 1992 Mikhail Gorbachov declared that Brazil should delegate parts of its rights over Amazonia to a competent international organism (Chagas, 1997 and quoted by Dreifuss, 1998: p.18). No wonder, then, that in the military perspective, the clear view of the preservation of territorial integrity and unity of Brazil is constantly reasserted as crucial. As has been stated by the armed forces, "sovereignty is preserved as long as possession and jurisdiction over the territory is guaranteed, along with its indivisibility and the possibility of political actions that aim to preserve our vital interests". They have argued that the flexibilizaton of the concept of sovereignty can not go beyond this limit.[67]

5.3.3 The debate over the internationalisation of the Brazilian Amazon

On various occasions Brazil has been asked to assume its responsibility vis-à-vis the international community. I have illustrated the above arguments with statements by former French president Mitterand, vice-president Al Gore, and Mikhail Gorbachov.

The so-called internationalisation of the Amazon has been perceived as a real threat in Brazilian circles. Thus, in 1991 the congressional commission of inquiry on the internationalisation of the Amazon (CPI) was established and asked to investigate the existence of clandestine airports and the activities of religious missions in parts of Roraima, which was supposed to have provoked the internationalisation of the Amazon. In the final report the CPI put much attention on the development model followed and the mineral riches of the Amazon. Many of the denunciations were couched in terms of a mainly Anglo-American neo-imperialism conspiracy, in which the environment served as pretext for the new international order and in which NGOs played a leading role (Kolk, 1996: p.121). To quote Kolk (1996), feeling threatened by the environmental issues and the consequences which this might have for the position of the national state in crucial economic areas, sovereignty and nationalist claims increased. It could be suggested that the environment replaced the east-west conflict as far as the military construction for domestic purposes was concerned.

Brazilian preoccupation with the internationalisation of the Amazon could be seen in three concrete responses: The program of debt-for nature swaps, the *Calha Norte* program, and statements under the *Nossa Natureza* program. In the first case the United State, France and the Netherlands put forward a proposal for debt-for-nature swaps, in which a portion of Brazil's foreign debt would be exchanged in return for conservation projects. Brazil with the largest foreign debt and the most extensive rainforest was a target. However, in announcing the new policy (Nossa Natureza) Sarney rejected the program on the grounds that they were an infringement of Brazilian sovereignty. The fierce reaction of the Sarney government against the program debt for-nature-swaps can be illustrated with Sarney's statement at the Manaus meeting in 1989. There he stated that "there is no international capital which can buy

[67] See "*O Brasil e suas Forças Armadas*" Estado-Maior das Forças Armadas. Presidência da República, Brasilia, 1996, p.19.

even one meter of Amazon soil". The worries was that debt-for nature swaps could imply not only the creation of a large Amazon reserve to protect the environment, but also a future internationalisation and exploitation of minerals by international forces under the pretext of the environment.

The second example is the *Calha Norte* project aiming to intensify the military presence in the Amazon, more precisely north of the river Solimões and Amazonas. Born in the year of the transition from the military to civilian government, it was justified by a number of reasons. However, it seems that one of the most influential factors was the possibility of the creation of a binational Yanomani Indian park. The main preoccupation was that the Yanomani Park in the Venezuelan-Brazilian border could evolve into an independent indigenous state, manipulated from abroad.

Finally, in the case of *Nossa Natureza*, the program was formulated to diffuse international pressure due to the international outcry about the rate of deforestation, the murder of Chico Mendes and the Indian manifestation in Altamira. In that sense the centrepiece of the proposal was a five-year $100 million program to undertake agro-ecological zoning of the Amazon. As can be seen from the words "our nature" there is a clear nationalistic connotation reassuring implicitly absolute Brazilian sovereignty over the Amazon.

5.3.4 Militarising the Brazilian Amazon or greening the military apparatus?

Here I want to show how the involvement of the military in environmental matters was not only evident during the military regime, but also in the civilian period continuing up to now. Thus, for instance the traditional preoccupation with national integration was increasingly overlain by concern that Brazilian sovereignty over the Amazon was being called into question, and this became the dominant theme in the Sarney administration's response to international criticism.

As an illustration of my argument, after the military government the Secretariat for National Defence (SADEM), the successor of the dictatorship's secret service (SNI), which co-ordinated *Nossa Natureza*, was created. Former president Collor had integrated SADEM into the Secretariat for Strategic Affairs (SAE) as the Department for Special Programmes, whose responsibilities included *Calha Norte.* Another SAE department for macro-strategies, has co-ordinated the Ecological-Economic Zoning (ZEE). As part of the Collor programme for the environment, SAE was given an important role in the preparation of environmental policy (Kolk, 1996: p.110). In addition, the weak and competing former Environment Secretariat (SEMA) and the Forestry Institute (IBDF) were combined along with two other small units, to produce a unified environmental agency (IBAMA). This was nominally under the Ministry of the Interior, but operating with financial autonomy under the leadership of Sarney's former press spokesman Fernando Mesquita.

The most recent relevant example of military participation in designing and co-ordinating environmental policies is found in the establishment of the Protection System for Amazonia (SIPAM), and the Surveillance System for the Amazon (SIVAM). The SIPAM has three regional bases (Portho Velho, Manaus, and Belém), and general headquarters in Brasilia. It is under the umbrella of SIPAM that the much talked about *Sistema de Vigilãncia da Amazonia* (Surveillance System of the Amazon region) is being implemented. SIVAM is once again a civilian-military project, integrated under the *Secretaria de Assuntos Estratégicos* (SAE).

In official language it has been stated that the principal aim of SIVAM (which started to function in July 1997 and is expected to be ready by the year 2002) is to allow for the effective implementation of SIPAM, providing the Brazilian government with the necessary information for sustainable development. Among the most important information that the system will provide to the Brazilian government are: control of land occupation and usage,

surveillance and control of borders, identification of illegal activities, and economic and ecological zoning. The infrastructure is made up of a remote censoring network, which among others, includes eight meteorological and environmental satellites, five sensor-equipped Embraer ERJ 145 aircraft for aerial early warning (AEW), capable of registering images through the dense tree forest cover and providing information on the quality of soil. In addition, it includes three Embraer 145 RS planes for remote censing, carrying Swedish radar, and twenty radar stations co-ordinated by Cindacta, which already has five of them functioning to control air traffic (Dreifuss, 1998: pp.28-9).[68]

SIVAM has also been placed within the sovereign discourse. For example, it has been stated by the company Raytheon (chosen to build the system) and the Brazilian authorities that among the principal highlighted benefits Brazil will gain from SIVAM are: the capacity to have positive control over the area and the capacity to promote the integration of communities among themselves and with the ecosystem, guaranteeing Brazilian sovereignty in the Amazon forever (http://wwww.raytheon.com).

Everything that has been said shows that the environmental discussion over the Brazilian Amazon has been framed to a large extent within the security framework. Logically the defender of national integrity and independence has reacted with scepticism to the notions of transboundaries effects of the process of environmental change in the Amazon basin. Regardless of this scepticism, lately the military has not adopted a position of open confrontation over the environmental management of the Amazon. On the contrary they are still participating actively in such process. A clear example is their influence in SIVAM as well as in the elaboration of the *Macro-Zoneamento Ecológico-Económico da Amazonia* which is under the Secretary of Strategic Affairs (SAE). [69] As an example, in a document produced in 1995 with the participation of SAE it is stated that strategic perception of the Amazonian region without diminishing the importance of national frontier places great emphasis upon environmental worries and needs, as well as on the wealth of natural resources (biodiversity, water, minerals).

The combination of the above mentioned factors could result in the change of paradigm from frontier development to sustainable development. That can partially be observed in a recent statement by the Army Chief of Staff, General Gleuber Veira "the new mission is co-operating with socio-economic development".[70] However, it remains to be seen if the situation of framing Amazonian policies within the security framework will mean a militarisation of environmental policies in the Amazon or will produce the contrary outcome; which is the greening of the army apparatus.[71]

---

[68] Information given by Coronel Antonio Faria, Secretaria de Asuntos Estratégicos, conference at *4th National Encounter of Strategies Studies*, Unicamp, Campinas. 10-15 May, 1998.

[69] For more on this see *Análises Temáticas e Sistema de Informação Territorial para Macro-Zoneamiento Ecológico-Económico da Amazônia*. Resumo Ejecutivo. 1st version, August 1995 (Convenio FBDS/ SAE/ IBGE/ FUNCATE/ SISCEA).

[70] General Gleuber Viera, chief of staff of the army, in his conference at the *4th National Encounter of Strategic Studies*, Unicamp, Campinas. 10-15, May 1998.

[71] For a discussion on this see Alexander López (1999) "Environmental change, security and social conflicts in the Brazilian Amazon". In *Report Environmental Change and Security Project.* Issue 5, Spring 1999. The Woodrow Wilson Center. Washington D.C.

5.4 Internal attributes of the Brazilian Amazon

This part deals with the second objective of this chapter, which is to present the main internal attributes of the Brazilian Amazon. Thus, once I have presented the main interaction between the suprasystem and the system it is my aim to display the main features of the system. The above is important for two reasons. First, it will show how some internal attributes of the system have been influenced by the system-suprasystem dynamics, and secondly it will give us the general background for further elaboration of the case studies. In order to carry out this second objective I divide this part of the chapter in three sections. The first deals with the variable of environmental change. This is followed by an analysis of state performance in the Brazilian Amazon, and finally the third section introduces the main aspects of social dynamics in the basin.

5.4.1 Main ecological features and environmental change in the Brazilian Amazon

This section includes first an exposition of the main ecological features of the region. Secondly there is a brief description of the sources and extent of environmental change in the Brazilian Amazon. This is measured by the evolution and rate of deforestation. Third, it presents the systemic nature of the variable of environmental change. This is, how this variable is linked to natural, economic and social aspects. The discussion of the main ecological features of the basin and the process of environmental change taking place in the Amazon is important for several reasons. In terms of the research problem of this dissertation it should be considered that several social groups living in the Amazon have a permanent and intimate relation with the habitat arising from their dependence on it. Therefore, in order to explain partially why an accelerated process of land degradation, flooding, or deforestation can increase the potential for conflict, one should evaluate the importance of soil, forest, and water as an instrument to keep social harmony in the Amazon.

Concerning ecological features, most of the Amazon is a warm, humid world where water cycles driven by equatorial solar energy maintain a permanent rainforest vegetation. On the one hand it has certain prominent features such as large rivers, relatively homogeneous tropical forest cover, low density of population, and high diversity of flora and fauna. On the other hand there are significant intra-regional and inter-regional variations as is going to be noted in the next two chapters dealing with the case studies. Soil types, Amazonian habitats, and types of river waters are the most important ecological features in terms of the research problem of this dissertation.

5.4.1.1 Amazonian soils

Amazonian soils have been the focus of controversy for a long time. The major factor has been the fertility of these soils. During the nineteenth century most of the opinions state that the region must be very rich given the lushness of the vegetation. A severe attack suggesting that they were so poor that they could not support complex cultures or intensive cultivation followed those ideas. Recent studies show that the soils of the Amazon are among the richest and the poorest in the world and there is a great variation across the whole basin. [72] The importance in addressing the issue of Amazonian soils in this dissertation is due to its influence on food security as well as on colonisation instability.

Knowledge of Amazonian soils over the whole basin is limited. Most of the information available refers to concrete areas, normally the ones close to research stations, or close to

[72] Among the authors addressing the issue of Amazon soils are Betty Meggers (1954), Carneiro (1957), Sanchez (1982), Furley (1990), Hetch (1981), and Moran (1981, 1983).

areas where development programs and colonisation have taken place. As can be seen in table No.4, a general classification shows that the most extensive groups of soils occupying around 75 % of the area, consist of nutrient poor, acid Oxisols and Utisols.[73] Poorly drained soils typical of alluvial, food plain and palm swamp areas cover a further 14 %. Moderately fertile and well-drained soils, belonging to a variety of sub-orders (especially Udalfs, Fluvents, and Tropepts) occupy around 8 % of the basin. Approximately 3 % of the region consists of very infertile, acidic and sandy soils, including the Psamments (Furley, 1990 & Cochrane and Sánchez, 1982).[74] Therefore, the major part of the Brazilian Amazon consists of nutrient-poor, acidic soils, often with a problem of aluminium toxicity and with a quarter of the soils either poorly drained or flooded.

Table 4: Distribution of soils in the Amazon

Type of soil	Percentage it occupies
Poor acid soils (Oxisols & Utisols)	75 %
Poorly drained soils (Aquents, Gleysols)	14 %
Well drained and fertile soils (Alfisols, Mollisols, Vertisols, Tropepts)	0.7 %
Infertile, acidic and sandy soils (Spodosold, Psamments, Padsols)	0.3 %

Source: Furley (1990) & Cochrane and Sánchez (1982).

In a large part of the current literature there is pessimism about the capacity of the Amazon soils to sustain settlements. This view is based very much in the utilisation of shifting cultivation as the main form of land use in the Amazon. This system has basically been an answer to the "poverty" of the Amazonian soils and for this reason farmers have been forced to switch land every two or three years due to the decline in fertility of the soils caused by the loss of the limited nutrient available after burning.[75] Loss of nutrients is caused basically by deforestation. When the forest is removed the soil becomes compacted, so infiltration of rainwater into the soil is decreased. The result is that rainwater runs off over the surface rather than sinking into the soil, causing sheet erosion and affecting crops such as rice and maize.

However, *How representative is the available data to be either pessimistic or optimistic?* In principle, the analyses have been formulated at macro level, so if one moves to micro scale

[73] These soils are with low fertility. The Oxisols are characterised by an oxin horizon consisting of hydrated soils. The main difference between Oxisols and Ultisol soils is the increase in the percentage of clay with depth in the Utisols, an increase not found in the Oxisols. Thus, the physical characteristic of Utisols is less favourable than those of Oxisols, not only because of the increase in clay with depth but also because they tend to occupy steeper areas.

[74] Cited by Peter Furley in "The Nature and Sustainability of Brazilian Amazon Soils". In David Goodman & Anthony Hall (eds.). *The Future of Amazonia. Destruction or Sustainable Development.* Macmillan Press, 1990.

[75] In relation to shifting cultivation, Furley (1990) has stated that: "Whilst ecologically and pedagogically sound within generalised guidelines, is a prodigal consumer of land and can maintain population only a subsistence level".

units the homogeneity evident at the regional level yields to increased variability. To take one example cited by Moran (1981), from the point of view of policy reliance the decision to focus colonisation along the TransAmazon highway in Altamira was based on the identification of medium to high fertility alfisols, which appeared to dominate in the region cut by the road. Colonists were placed on all available lots as they arrived, since soils appeared homogeneously good, and the same crops were promoted. However, after the colonists were settled, researchers such as Smith (1982) Moran (1984)and Fearnside (1984), pointed out that the soils of the area are a patchwork, with radical differences in nearly every kilometre.

The properties of Amazon soils also influence food production. As a general rule food production is low in the tropics, and the Amazon basin is no exception. A major reason for the low food production of the tropics is the fertility of most tropical soils. “Plant nutrients in the soils are more soluble under the high temperature and moisture conditions of the tropical rainforest, and chemical leeching frequently proceeds at such a rate that the direction of change is toward impoverishment” (Lee, 1957: p.30).

It seems paradoxical then, that such plant life is found growing in such infertile soils, but the simple explanation for this lies in the plant life itself. The trees are large, lush, and profuse because they rather than the soil store most of the elements in the soil-plant cycle (Batt, 1976: p.45). It is clear, then, that the basic reason for the low food production under continuous cultivation in the tropical rainforest is that the soil cannot sustain fertility for long after the trees are cut down. This could partially explain why currently the Brazilian Amazon region is an importer of food.

5.4.1.2 Amazonian habitats

Now I will present an overview of the Amazon basin’s habitats. A common distinction is made between *terra firme* (uplands) and *várzea* (floodplains). The *várzeas* make up about 2 % of the Amazon basin, but their importance to the human population is highly significant. It has been stated that *várzeas* with proper flood control can perfectly promote small farmer production of irrigated rice, tree crops, food crops and jute, as well as water buffalo and fish, without damaging the environment. For instance Hall (1986), Barrow (1988), Pearce and Myers (1989) point out that floodplains could support up to 1 million farming households, or more than 5 million people. Another common factor is the carrying capacity of the floodplains, which is relatively high. This capacity is based heavily on the productivity of the fisheries and on agriculture along the alluvial beaches and levees.

According to Moran (1993) the agricultural potential of the floodplains remains imperfectly developed. Such development may never be achieved if current projects in the region do not avoid destroying the basis of their productivity. Hydroelectric dams and mining activities are two types of activity particularly damaging for the *várzea* area.

If *várzeas* covers 2 %, then the other 98 % of the basin comprises *terra firme* (upland). Amazonian upland forest constitutes one of the richest terrestrial ecosystems in the biosphere, with the greatest accumulation of species and plant biomass on the planet. This is the area that has been experiencing the highest rates of deforestation. Most of the upland has several limitations for agriculture because of its extreme acidity, high aluminium saturation, and low nutrients (Moran, 1993: p.21).

5.4.1.3 Amazonian waters

The rivers were and still are the lifelines of the area. To illustrate it can be said that before 1962 there was no road connecting the Brazilian Amazon with the outside world. It was the Belém- Brasilia highway that transformed this situation. In the literature on the Amazon the rivers draining the Amazon are classified as *whitewater*, *clearwater*, and *blackwater*. The

concept that waters of different qualities may exist in the Amazon is supported by the existence of rivers and creeks with different watercolours. This can be shown by local names like Rio Negro (black river), Rio Branco (white river), and Rio Verde (green river).

For the purpose of this research the differentiation is important because each type of water is associated with survival strategies of the local population. This is due to the implications of the type of waters on food security (crop plantations and farming). For instance whitewater rivers (Madeira, Purus, Jaruá, Jutai) provide a great part of the fish in contrast to blackwater rivers. In terms of productivity as Smith (1979) has noted, the black water lakes have a fish productivity fifteen to nineteen times lower than lakes fed by white water rivers. The second type is clearwater rivers. The name is given to all rivers with transparent green water. Those rivers drain areas of the Brazilian plateau and Guiana Plateau carrying sediments of medium to low fertility. The Tapajós, Trombetas, Xingú, and Curuá Una Rivers are within this category. Finally, blackwater rivers drain areas with a predominance of white sand soils extremely acid and poor in nutrients and covered with vegetation. They are poor in nutrients, so their contribution to production is low. The black colour of the water comes from the large amounts of undecomposed organic matter and dissolved chemical from the vegetation. Examples of this type are Rio Negro, and Rio Urubú.

It is clear the interaction between man and hydrochemical condition. For instance whitewater rivers provide a large part of the total catch of inland fisheries of the state of Amazonas, fish being the principal source of protein for the Amazonian population. In addition, the fertility of the water is to a certain extent correlated with the sediments carried by the river. As Junk and Furch (1985) mention, floodplains (várzeas) of whitewater rivers are composed of sediments derived from the Andes, and are rich in nutrients, being used by man in crop plantation and farming during low water periods. In contrast soils of floodplains of blackwater rivers are poor in nutrients, and their production potential is consequently low. Therefore, since the beginning of colonisation in the Amazon, the shores of whitewater rivers have in general shown a higher population density than the shores of blackwater rivers, which are locally termed "*rios de fome*" (hunger rivers).

Table 5: Origin of the main rivers in the Amazon

River	Country	River	Country
Marañon	Perú	Madeira	Bolivia
Huallaga	Ecuador	Purus	Perú
Ucayali	Perú	Jurua	Brazil
Napo	Ecuador	Negro	Venezuela
Putumayo	Ecuador	Tapajós	Brazil
Ica	Colombia	Xingú	Brazil
Japura	Colombia	Tocantins	Brazil

Source: Comisión Amazónica de Desarrollo y Medio Ambiente (1992).

5.5 Analysing the four chosen independent variables

The following section describes and explains the performance of the four independent variables chosen in this study. Thus, environmental change, allocation of resources, distribution of land and population growth are analysed here at a system level (the Brazilian Amazon).

5.5.1 Environmental change in the Brazilian Amazon: sources, extent and dynamics

In the previous paragraphs I have pointed out the main ecological features of the Brazilian Amazon that have direct relevance to the research problem of this dissertation. Now, as a second step I will describe and explain the environmental disturbance taking place in the Amazonian ecosystem, using the variable of deforestation to illustrate such processes. For that reason, in the following pages I will state the main sources of deforestation, the extent and rates of such phenomenon, as well as the relationship of this process with other socio-ecological factors.

5.5.1.1 Proximate and underlying sources of deforestation

In this section I am not going to explain each source in detail, because such an exercise will be done when analysing the case studies of Roraima and Pará. Therefore, what I will do here is mention the main sources, while grouping them according to Fearnside's classification. On a general level the main direct sources of deforestation in the Brazilian Amazon can be attributed to cattle ranching, colonisation and agricultural settlements, road building, mining, logging, dam construction, and urban development. Agropastoral activities in most of the Amazonian literature are considered to be the most significant. The category of private capital investment in cattle ranching through tax incentives, agricultural production through rural credits, and small farmer settlement in the Amazon region are the most important direct factors influencing the agropastoral activity and placing it as the most important source.

Fearnside (1986) has made an important classification of the causes of deforestation. He divides the present causes into two categories: proximate causes, and underlying causes. Proximate causes motivate landowner and claimants to direct their efforts to clearing forest as quickly as possible. The underlying causes are linked to wider processes in Brazil's economy (Fearnside, 1986: p.42).

Among the main proximate causes of deforestation are, as Fearnside points out, land speculation, tax incentives, and negative interest loans. The first one is related to the fact that clearing establishes proprietary claims, and raises the resale value of land. Fiscal incentives allow businesses to avoid paying taxes owed on enterprises elsewhere in Brazil if the money is invested in Amazonian ranches. The third one has to do with the financing of government-approved ranching projects at nominal interest rates lower than inflation.

In addition, certain general macroeconomics policies such as income tax, the land tax and land titling regulations are providing economic incentives for deforestation. Land taxes were aimed to convert unused forestland into a more productive one, therefore farms containing forest were taxed higher than the ones containing only pasture and cropland. In this way there was a specific incentive for large landowners to convert their forestland. The policy on income tax refers to certain activities such as agriculture that were exempted from Brazil's income taxes, which provide other incentives for land acquisition in the Amazon by corporations and wealthy individuals.[76]

The other group of causes mentioned by Fearnside is comprised of the underlying sources, where he lists inflation, population growth, road building, and national politics. Inflation promotes speculation in real property, especially pasture land. Moreover, it increases the

[76] According to Pearce, Barbier, Markandya (1990) tax incentives tend to increase the demand for land in the Amazon, speed up conversion of land for agricultural uses, raise the price of land, increase inequality in land ownership holdings, and finally increases the pace of migration of poor people to the frontier areas in search of land.

attractiveness of low-interest bank loans for clearing. Population growth increases the demand for subsistence production, the capacity to clear and plant both for subsistence and cash crops, and the political pressure for road building. Road building promotes immigration to the Amazon, and increases land clearing by persons already present. In terms of national politics there is a tendency of the Amazon interior residents to support incumbent governments providing incentives to increase political representation in these areas by creating new territories and states, justified by population growth achieved through colonisation programs and highway constructions (Fearnside, 1986: p.45).

Using Fearnside's classification I reiterate what I said at the introduction of this section, which is that the two factors of proximate causes (cattle ranching and colonisation schemes) and one from the underlying causes (road building) are the most important in the dynamics of deforestation. This argument will be supported empirically in the next two chapters dealing with the case studies.

5.5.1.2 Extent of deforestation

As deforestation is the most visible aspect of the transformation taking place in the Amazon, it is around this issue that public debate has been concentrated. Thus, an important discussion has taken place on the extent as well as the impacts of deforestation on the Amazon basin. In the debate some groups (political, and academic) may have exaggerated deforestation rates to further conservation aims, while others may have downplayed figures in order to encourage further development of the region.

The extent of deforestation has lead to academic and political debate, for two reasons: first, because of an inadequate understanding, even though the tool of remote sensing has been applied; and secondly, for its clear implications on policy making. For instance, the Brazilian government has been concerned about the empirical data published by studies on Amazonian deforestation, especially after the World Bank in 1988 financed a study on Amazonian deforestation, which came out with a high rate of deforestation in the Amazon (close to 12 %). In order to quantify the rate and extent of deforestation in the Brazilian Amazon I will use three sources of information: first, the latest INPE estimations, second the study on Tropical Deforestation and Habitat Fragmentation in the Amazon, under NASA, and finally some estimations by Peter May & Eustáquio Reis that are heavily based on INPE numbers.

Although deforestation is recognised as a problem, it is doubtful to present an exponential rate for the region that will mean that the cleared area could rapidly expand to encompass the entire region. Thus, rather than remaining exponential, forest depletion rates vary from year to year and vary from region to region as it will be noted in the case studies.[77] Some of the trend analyses made in the early 1980s (exponential ones) indicate that the states of Pará, Mato Grosso, Maranhão, and Rondônia would be completely deforested by 1990. Data obtained from satellite imagery shows that in Rondônia, the most deforested of Amazonian states, no more than 12.6 % had been cleared in 1990.

According to May and Reis (1993), in the mid-seventies deforestation was practically restricted to the so-called Bragantina area, located on the eastern border of Pará with Maranhão, and to the north of Tocantins. During the late seventies and through the eighties deforestation rates within the region showed spectacular growth, most specifically in northern Mato Grosso, following a north-west path of expansion toward the states of Rondônia and Acre, stimulated by the paving of highway BR-364. As can be seen in table No.6 there are

[77] For instance, Fearnside made some exponential projections based on the data published by INPE. Fearnside started a series of publications using mathematical projections. His first work formulated the problem in an exponential way. However, by 1989 he concluded a new projection on deforestation, now introducing a linear mathematical projection instead of an exponential one.

notable differences in the regional distribution of deforestation in the basin. In the legal Amazon, Pará, Rondônia, and Maranhão experience the most severe processes of deforestation.

The states of Mato Grosso, Maranhão, and Tocantins only include the portion of the states pertaining to the legal Amazon. In short, during these years deforestation in the legal Amazon was still restricted mainly to the peripheral areas in the eastern, southern, and south-western borders of the region. This area also received a disproportionate share of economic activity, government investments, and regional development incentives.

Table 6: Deforestation rates in the states of legal Amazon. Deforested share of each state (1975-1988)

State	1975	1978	1988
Acre	0,76	1,60	5,78
Amapá	0,11	0,12	0,55
Amazonas	0,05	0,11	1,26
Pará	3,89	4,52	10,39
Rondônia	0,51	1,78	12,60
Roraima	0,02	0,06	1,22
Mato Grosso	1,15	2,49	8,91
Maranhão	23,55	24,55	34,90
Tocantins	1,26	1,14	7,79
Legal Amazon	2,55	3,10	7,64

Source: INPE-1649- Rpe/103 for 1975 and INPE (1992) for the remaining years. Cited by Peter May & Eustáquio Reis, in Working Paper No.565 "The user structure in Brazil's tropical rain forest". March 1993. Kiel Institute of World Economics.

In May 1994, the subcommittee of Western Hemisphere Affairs of the United States Congress conducted a hearing on the issue of deforestation in the Brazilian Amazon. Two scientists, Compton Tucker and David Skole, presented the result of an independent study commissioned by NASA. These results were published in the issue of March 25, 1993 of "*Science*" magazine.

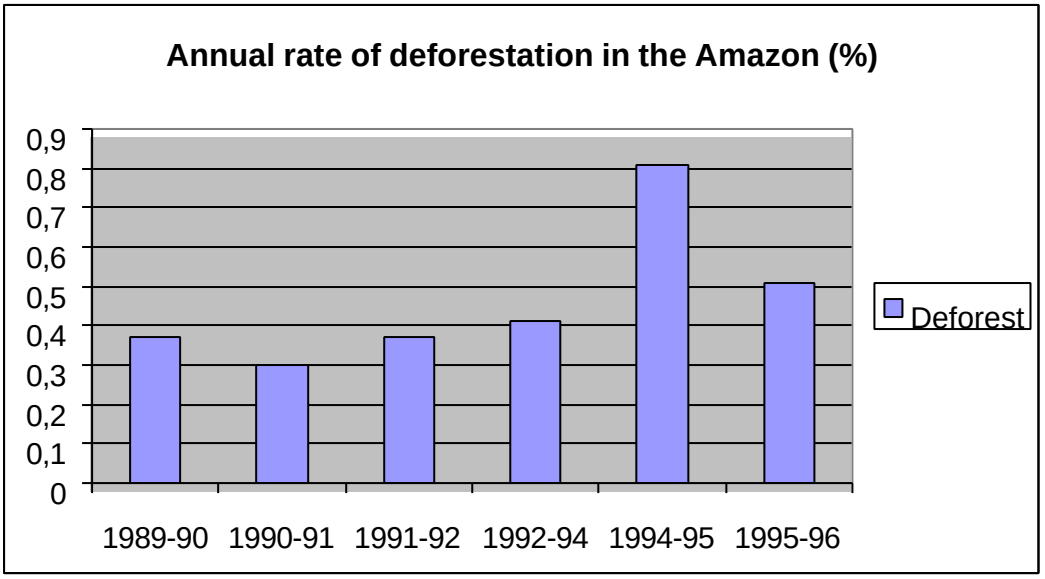
Tucker and Skole stressed that the difficulty of monitoring changes in such a vast region as the Amazon gave rise to tremendous discrepancies with regard to the extent of deforestation. They specifically mentioned the erroneous figures published by the World Bank in 1988 that I have mentioned here. They found that 6 % of closed canopy forest had been cleared as of 1988, and around 15 % of the forested Amazon was affected by deforestation, caused by habitat destruction, habitat isolation, and edge effects.[78] For the entire Brazilian Amazon, they estimated that by 1988 around 230.000 km2 had been deforested. These figures were close to but lower than the 280.000 km2 estimated by INPE for the same year. The difference

[78] The data presented by Tucker and Skole show that in 1988 the isolated forest in the legal Amazon was 16.228 Km2 and the edge effect was calculated in 341.052 km2. Thus, if one adds the 230.324 of deforestation one will have 587.604 km2 of total forest affected in 1988.

of 30.000 km2 results from a different evaluation of the forest-*cerrado* boundaries in Mato Grosso and Tocantins.

Finally, INPE estimations show that there has been an important increment in the total area deforested. The total area deforested increased from 401.400 km2 in 1989 to 517.069 km2 in 1996.[79] However, when one takes the relative numbers it is possible to see that there has not been a constant increment in the annual rate of deforestation in the Brazilian Amazon. Graph No.1 shows how the rate of deforestation during the period 1990-91 (0.30) is lower than during 1989-90 (0.37). The rate for the year 1995-96 (0.51) is also lower than the 0.81 during the year 1994-95. [80] That means clearly that the Brazilian Amazon is an open system ruled by internal and external forces that determine years of increasing rate of deforestation, but years of decrease too, of course in relative terms.

Graph 1: Annual rate (%) of deforestation in the legal Amazon (1989-96)



Source: INPE (1998)

In conclusion there is an evident problem of deforestation. However the greening of the Amazon has contributed to slight exaggeration of the real situation. The deforestation problem has to be seen in context, which means understanding that it is strongly associated to socio-economic variables. The Amazonian deforestation must not only be presented as a problem in which the Brazilian society are cutting down the trees in the Amazon region, but rather as a problem which primarily has to do with the way of living of millions of Brazilian people.

5.5.1.3 The systemic nature

Considering that deforestation is the variable of environmental change that has already been analysed, I would now like to briefly describe the set of interconnections that such a process has with Amazonian soils, climate, forest use, water system, fauna, food security, and tribal population.

---

[79] The total area deforested annualy (km2) in the legal Amazon is as follows: 1989 (401.400); 1990 (415.200); 1991 (426.400); 1992 (440.186); 1994 (469.978); 1995 (497.055); 1996 (517.069).

.

[80] The annual rate in percent is as follows: 1989-90 (0.37); 1990-91 (0.30); 1991-92 (0.37); 1992-94 (0.40); 1994-95 (0.81); 1995-1996 (0.51).

Concerning soils, the relationship is built as follow: deforestation increases run off as the combined result of soil compaction causing decreased infiltration of rainwater and reduced leaf area causing decreased evapotranspiration. The role of vegetation is fundamental because around 75 % of the rainfall returns to the atmosphere through evapotranspiration (Moran, 1993: p.22). If the rainwater runs off over the surface rather than sinking into the soil, the immediate result will be soil erosion, which has clear consequences on agriculture, and therefore on food security.

In terms of climate, as I have mentioned, rainfall in the Amazon is closely tied to the presence of forest. The impact of widespread deforestation on the water cycle is a serious concern because of its potential negative effects on forest survival in the Amazon and on agriculture (Fearnside, 1990: p.184). Of course a large amount of the discussion around climate change is related to the Amazonian contribution to the emission of carbon dioxide. However, it is important to remember that carbon dioxide is not the only contributor to the greenhouse effect; methane (CH4), and nitrous oxide (N2O), although present in much lower concentrations, have impacts that are now recognised as important, and both of them are produced by burning forest and pasture. As Goreau and Mello (1987) point out, methane release increases from converting forestland to pasture through the initial burning process, and also because the soil then changes from a consumer to a producer of methane, at least in the dry season.

In relation to the impacts of deforestation on forest use, it is clear that the loss of natural ecosystems eliminates economically valuable species such as trees for hardwood timber, trees producing extractive products, including rubber and Brazil nuts, and the many medicinal plants whose economic exploitation is presently minuscule (Fearnside, 1990: p.188). The potential for obtaining valuable genetic material from the forest is another opportunity-use that is sacrificed by deforestation.

Finally, when it comes to indigenous people and forest species, the impact of deforestation on the former means, as I will show in the case studies, social conflicts and loss of cultural identity. For instance, the process of removing tribes from the forest areas they still occupy has accelerated as new areas are targeted for mining and hydroelectric dams. With regard to loss of forest species, what most exposes this diversity to destruction by deforestation is the highly localised distribution of many species. Because of this endemism, species can be eliminated without deforesting a very large area.

The systemic nature of environmental change is also perceived in the social consequences of the disruption of the three most important environmental functions. Thus, overuse of natural resources in the Amazon has been provoked basically by non-participative authoritarian and badly administered development measures. The overstrain of the environmental sink capacity is caused among other factors by the danger presented by mercury pollution. Finally, the impoverishment of the space of living is provoked above all by ill-conceived macro-projects e.g., large dams, cattle ranching and mining activities. A clear linear relationship of impoverishment of the space of living is the one built from *deforestation* to *soil erosion*, to *loss of nutrients*, to *deficient crops*, and consequently to *decrease in the well-being of the Amazonian population*.

The social consequences of the overuse of natural resources, overstrain of the sink capacity and impoverishment of the space of living are evident. Among the most important of these consequences that can be mentioned are the decrease in food security, threats of new deceases and expansion of the already existent, and the low level of colonisation stability, meaning fast intra-regional migration. This last factor which implies a high rotation rate has a direct effect on the social conflicts taking place in the basin.

It is normally assumed that environmental disruption causes ecological scarcity, and that ecological scarcity in the same way could contribute to social conflicts.[81] However, it is my argument that even though in the Brazilian Amazon there is a clear problem of undermining of the classical functions of the environment, there is not a real problem of scarcity of renewable resources such as cropland, forest, and water. Therefore, the role of ecological scarcity as a variable that cause conflicts is obscure in the Amazon case.

Finally, I want to illustrate synoptically the social implications of environmental change in three of the most important resources of the Brazilian Amazon: land, water, and forest. When it comes to land the low ecological carrying capacity of the Amazon basin, especially in the tropical *terra firme* soils, brings about specific limitations to colonisation and agropastoral activities. As an example, the rapid decrease in agricultural production on colonised soil, inhibits capital accumulation, settlement stability, and consequently, the building of stable social relations. Thus, this situation causes permanent migration accompanied by further deforestation, which in many cases results in open conflicts on access to land-resources.

There are several cases throughout the Amazon that concern water resources. The most well-known situations are, first of all, those caused by mining activities and the related pollution of waterway courses that result in conflicts mainly between Indian populations and *garimpeiros*, and secondly, are the conflicts due to the increasing pressure on fishery-resources of smaller lakes. The latter case is due to pressure for regional urbanisation, the development of fishing technology, the spreading of motor canoes and motor boats, and the growing number of regional ice-factories (Schönemberg, 1994: p.26). At least in the lower Amazon the local population consumes mainly fish caught in floodplain lakes. The contribution to lake-depletion of export oriented fishery therefore happens in a more indirect way inciting the foundation of ice-factories and generally raising regional competition between *geleiros* and *riberinhos*, who fish for subsistence.[82] The conflicts here involve several parties, but we can distinguish between the community-fishermen, who normally are interested in fishing locally, and the commercial fishery, where the activity of fishing is concentrated on doing business while ignoring the environmental impacts caused by their activities. Their practice is to move on to the next fishing- ground when one is cleared.

Social conflicts as a result of forest depletion in the Brazilian Amazon have been reported in several cases. The most well-known case has been the assassination of Chico Mendes, the former president of the Rubber Tappers Union. The process of deforestation and ranching activities in general has had a direct effect on the lives of the forest-dwellers. The most evident conflict has been the expropriation of the customary lands of forest peoples. This situation has to do with the surviving strategies of several groups such as Indians, rubber tappers, nut collectors, and *Quilombos*, whose way of living is strongly related to nature, and whose social organisation is based on the communal use of natural resources. This way of living is in opposition to the private exploitation of these resources by miners, large landowners, mining companies, and logging enterprises etc.

5.5.2 Distribution problems in the Brazilian Amazon

Here I argue that two core elements characterising uneven development in the Brazilian Amazon are land and income distribution and allocation of resources. These elements are

[81] By ecological scarcity I understand all the various ecosystem limitations as well as shortages of mineral resources and energy.

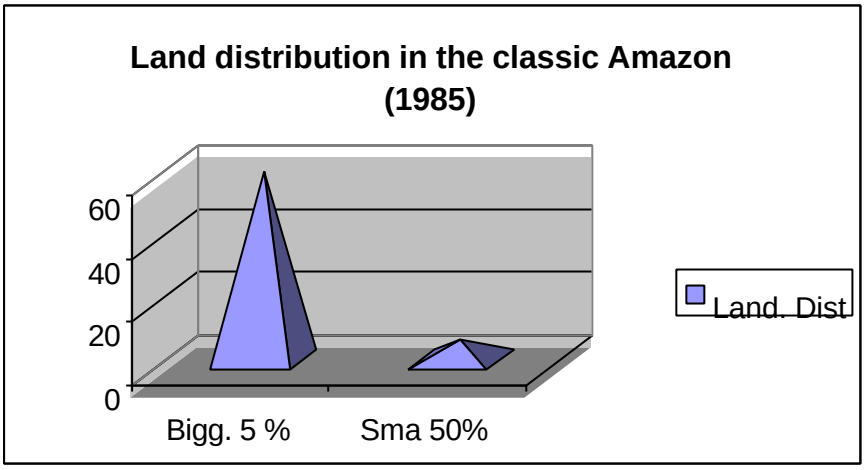
[82] *Geleiro* is a commercial fisherman using ice on their boats.

going to be evaluated in detail in the case studies as independent variables, and therefore I present here the basic features of each process.

Distribution refers to, "the division of income and wealth among individuals or families. Distribution is by ethical criteria, just or unjust, or by statistical criteria, skewed or even. Both allocation and distribution can interact in a number of ways. For instance even efficient resource allocation, when coupled with a skewed land distribution, may result in the colonisation of land unsuitable for agriculture by poor farmers with no land" (Foy & Daly, 1992: pp.50-51).

Brazil has a skewed distribution of income and land. In 1975, the 0.8 % of the farms of more than 1.000 hectares covered 43 % of the land area, while the 52 % of the farms under 100 hectares covered only 3 % of the land area (IBGE, 1987). In the *Censo Agropecuário* of 1985 farms under 100 hectares (representing more that 85 % of the total) covered only 13 % of the total land area (IBGE, 1987). The inequality in land distribution is also illustrated in the graph No.2. There, using the same data from 1985 it is showed how in the classic Amazon the biggest five percent of the total farms occupy 59,6 % of the total land, while the smallest fifty percent account for only 6,6 % of the total land.

Graph 2: Percentage of land occupied by the largest 5 % of the total farms and the smallest 50 % of the total farms



Source: IBGE Sinopsis Preliminar do Censo Agropecuário 1985. Includes data for the state of Rondônia, Acre, Amazonas, Pará, Roraima, and Amapá.

It is important to state that the concentration of land ownership is different across the regions. However, it is clear that historically the model of economic growth for the Amazon basin has been unable to incorporate the sector of population with low income into the regional economic cycle. Rodolfo Hoffman has developed a coefficient showing the level of concentration of land for the different states in the Amazon basin. The data is taken from different agricultural censuses.[83] As can be noted in table 7 there is a decrease in the level of land concentration for the period of 1960-85. Even though the total average for all the states is

[83] The form Hoffman presents is the following $G=S+G(1-S)$.
G is the fixed GINI coefficient
S is the proportion of families occupied in agriculture and cattle ranching
G is the common GINI coefficient.

still very high. The average for the region by 1985 is 0.80. The total monopoly of land will be the value 1.

Table 7: Coefficient of land concentration by federal state in the classic Amazon

State	1960	1970	1975	1980	1985
Rondônia	0,904	0,682	0,623	0,653	0,657
Acre	0,932	0,619	0,632	0,693	0,668
Amazonas	0,958	0,736	0,921	0,871	0,822
Roraima	0,669	0,618	0,887	0, 788	0,754
Pará	0,831	0,882	0,868	0,843	0,820
Amapá	0,936	0,871	0,855	0,850	0,865
Total	0,944	0,839	0,868	0,835	0,800

Source: Rodolfo Hoffman, Reforma Agraria, Vol.12, No.6, Nov-Dez, 1982, & Año 17, No.2, Ago-Nov 1987.

Another aspect to consider in terms of the distribution problem is income. Taking the whole country into account one can see that the distribution of income has changed little in the last two decades. It was highly concentrated. As can be seen in table 8 the GINI coefficient of income distribution from the year 1970 to 1988 for the whole country as a whole fell marginally, from 0.639 in 1970 to 0.625 in 1985, as a result of a slight reduction in the share of the upper 5 % of the population in the total income, from 37.7 % to 36.6 %, and also of small increase in the share of the lower 40 % from 6.7 % to 7.2 % (Curt Mueller, 1993: pp.9-10). However, in the same table, the GINI coefficient in the northern region (classic Amazon) worsened, increasing from 0.54 to 0.60. In short, income distribution as land is also skewed. In 1980, the top 10 % earned 47.9 %, while the bottom 40 % earned 9.7 %.

Table 8: GINI coefficient of income distribution in Brazil by region (1970-1988)

	BRAZIL	NORTH*	NORTH-EAST	SOUTH-EAST	SOUTH	C. WEST
1970	0.639	0.543	0.596	0.615	0.574	0.590
1988	0.625	0.609	0.638	0.591	0.580	0.634
SHARE OF UPPER 5 %						
1970	37.7	32.2	38.8	34.6	33.5	35.8
1988	36.6	36.6	41.8	33.8	33.1	39.5
SHARE OF LOWER 5 %						
1970	6.7	11.0	8.8	7.2	9.6	9.1
1988	7.2	8.4	7.8	8.6	8.9	7.2

Source: IBGE, Anuário Estatístico, 1991; Fundação Getúlio Vargas. Conjuntura Econômica, May, 1987: Alburberque, 1991. P.37.

*The income distribution indicators for the northern region (Classic Amazon) consider only the urban population.

Maldistribution has several repercussions. In the first place, its contribution to the enlarging of social gaps has had a direct effect on the level of conflict, because it is well-known that social gaps often act as a trigger of conflict. Secondly, maldistribution has also had a direct impact on the migration process to the Amazon, partially because of the land distribution inequalities elsewhere. It is well-known that the motive for the Transamazonian highway programs was to help defuse political tension in the north-east caused by great poverty, landlessness and the periodic droughts.

5.5.3 Misallocation as an internal attribute

Allocation of resources refers to the division of a given flow of resources among alternative uses. Allocation can be efficient or inefficient. Misallocation in the Brazilian Amazon has been witnessed above all in the areas of cattle raising, logging, and ownership rights. For instance, SUDAM allowed companies to invest up to 75 % of their income tax in approved Amazonian ranching development projects. In the same way the Brazilian Central Bank's rural credit has subsidised ranching through low interest loans. The consequences of misallocation are perceived in deforestation and soil erosion. The problem of allocation is notable by virtue of the inefficient outcomes from most of the economic incentives implemented by the Brazilian government. In the logging industry the government provided timber subsidies which encouraged deforestation without regard for sustainability of wood supplies.[84] As indicated by Repetto (1987), from 1981 to 1985, Amazonian forest-product producers and traders could borrow up to 100 % of their prior year's exports at interest rate as much as 30 % below Brazil's rapid inflation rate. Finally, regarding ownership rights, Brazilian law encourages deforestation by allowing squatters rights. This implies that land clearing is considered an improvement to land and evidence of ownership if the peasant has been on the land for five years. Then, land was allocated under this system.

A recent study indicates that general tax policies, special tax incentives, the legislation linked to land allocation, and the agricultural credit system, all accelerate deforestation in the Amazon (Binswanger, 1989: p.20). The capitalisation of these tax incentives into the price of land makes it impossible for the poor to acquire land by paying for it out of future production, since the capitalised value of the land is now greater than the capitalised value of the future products of the land by an amount equal to the capitalised value of the tax benefits. The above situation lead the poor to perceive that the only access to land ownership was to squat at the frontier, and deforest rapidly in order to consolidate their claim to the land.

As Foy and Daly (1992) point out, allocative distortions cannot be considered as somewhat random technical mistakes that are easily correctable by getting prices right, but rather are to a considerable degree the coherent implications of an underlying development policy of scale expansion and distributional concentration. It is for this reason that I have placed distribution and allocation as core elements of one of the most important attributes of the Brazilian Amazon, which is uneven development.

When taking into account both the Brazilian situation of land concentration, and the idea of economic growth formulated by the Brazilian government, one can clearly understand the conflict between *posseiros*, who responded to the government's call for small farmer colonisation, and the investor attracted by the profits that could be made by acquiring land with subsidies from the fiscal incentives program. The confrontations have been in many

[84] As cited by George Foy and Herman Daly in the 1970s, wood-processing industries in the Amazon received tax credits on their investment in approved projects of up to 50 % of their total income tax liability, and 75 % of the total costs. Between 1965 and 1983, about 500 million dollars of such funds were invested in wood-processing industries, which is 35 % of all tax funds committed to Amazonian investment.

cases resolved outside the legal system. As Schmink and Wood (1992) state, hired gunmen resorted to a variety of violent means such as burning, beating, torture or murder, to persuade the *posseiros* to move on. In many cases the threats of violence was sufficient to convince *posseiros* that it was in their interest to accept whatever offer they could get for the improvement they had made. The result is that it became common practice for migrants to occupy a plot, clear it of trees, and then sell out. Known as the *industria de posse* (land claims industry), this procedure was one of the few avenues open to migrants to earn cash.

5.5.4 Population growth

During the late 1980s and early 1990s the Amazon has been the object of special attention. However, as I have noted, this interest basically has to do with the deforestation problem, which in many ways has overshadowed part of the real problem in the Amazon, which is the social condition of the different social groups living in the basin. In many ways this "*greening of the Amazon*" has distorted perceptions of what is really happening in the region, and what the nature of the problem is. Thus, in many international as well as Brazilian circles, Amazonian problems have been reduced to the fact that the inhabitants and the Brazilian government are cutting down and burning all the forest. For that reason it has been more difficult to mobilise western public opinion on behalf of murdered peasants than on behalf of trees. In order to contribute to the understanding of the case studies in the next chapters, here I will briefly present population growth and a set of social indicators as internal attributes within the social dynamics dimension.

Contrary to popular belief, most of the Amazon population is currently urban. In the classic Amazon 56.1 % of the population is urban. Between 1960 and 1980 the urban population in the region grew by 10.9 % per year, while the rural population grew by only 3.9 % (IBGE, 1986). Towns have appeared along roadsides at major intersections, near colonisation projects and near centres of ranching, wood extractions and mining. According to population data by IBGE (1991) in the entire country of Brazil approximately half of the poor lived in rural areas and half in urban areas. In what is known as classic Amazon it is difficult to estimate the numbers and percentage of poor living in rural areas. Thus, according to the quoted census by 1990, the poor living in urban Classic Amazon were 22.4 million meaning 22.2 % of the total urban population.[85]

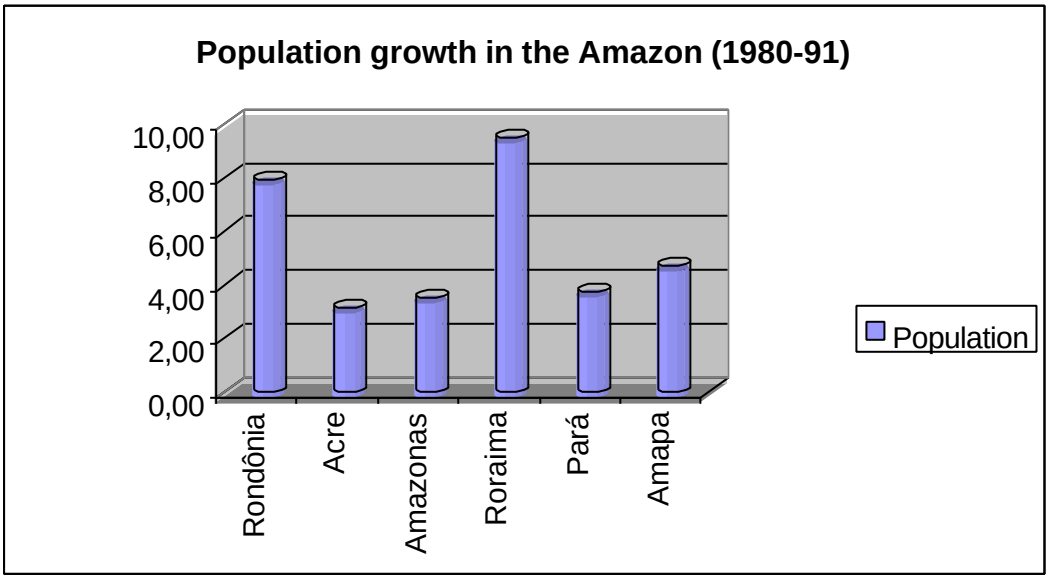
Although all the Amazonian states have experienced an important increase in population, the percentage of increase among them differs (see graph No.3). Population growth in the Brazilian Amazon has some of the highest birth rates found anywhere in the world today. The average number of children per woman in the 1980s was 6.7. Although Pará and Amazonas are the most populated states, Roraima and Rondônia as is shown in graph No.3, have experienced the most population growth in the 1980s. Roraima has a population growth of 9.5 % and Rondônia of 7.9 % the period 1980-1991.[86] What is interesting to note is that in both cases such growth cannot be attributed to high birth rates. In the case of Roraima, the most likely factor precipitating such growth was the mining economy, and in the case of Rondônia it was the colonisation schemes under *Polonoroeste.* Taking a look at the recent 1996 demographic census one realises that the above explanation is quite well grounded. From 1991 to 1996 the total population increase in those states has not been significant, coinciding

[85] More details on this are found in Charles Muller "Uneven development, poverty and the environment in Brazil" ISPN. *Documento de Trabalho* No. 31.

[86] The percentage of population growth for the period 1980-1991 is as follows: Rondônia (7.9 %); Acre (3.0 %); Amazonas (3.5 %); Roraima (9.5 %); Pará (3.7 %); Amapá (4.7 %). The total for the classic Amazon was 3.9 %.

with a decline in the mining economy in Roraima and the end of the *Polonoroeste* program in Rondônia. Thus, Rondônia went from a total population of 1.130.000 in 1991 to 1.229.306 in 1996 and Roraima from 216.000 in 1991 to 247.131 in 1996. The total population for the classic Amazon in 1996 was 11.288.259.

Graph 3: Graph 3: Percentage of population growth in the classic Amazon (1980-1991)



Source: IBGE, 1991

As I said the population growth in the Amazon basin is basically the product of a migratory process, a product of the opening up of the Amazon due to governmental activities. This is partially confirmed by the fact that the places with the largest populations are located around colonisation schemes and in areas connected by regional roads. Examples of the population growth in the 1980s are the cases of Cacoal (49.6 %), Ji, Paraná (29.9 %), Pimenta Bueno (27.6 %), and Vilhena (27.03 %) all of them in Rondônia (SUDAM, 1984).[87] As a result of the previous situation most of the migration in the Amazon can be qualified as Transformational migration. This is linked to economic and social changes in a region or a country, and as the name implies, it tends to radically transform both the distribution of people and traditional livelihood.[88] It also implies a fundamental change from one way of life to another, for both the actors and the system (Lisansky, 1990: p.106).

In conclusion, even though some data points to a relative improvement in some of the social conditions of the Amazonian population, the Amazon today reflects about the same patterns of land distribution and income concentration, and extreme forms of stratification found in the rest of Brazil. For the Amazon region the disparities could be greater that is revealed by the indicators, because in most cases the rural population has not been taken into account in census and statistic reports.

[87] This is data from SUDAM. Divisão Estatística. Amazonia Legal. Area Popula*ção* Residente Censitaria in 1970, 1980 e Projectada para Periódo 1981-1990. Belém 1984.

[88] Transformational migration is a category used by Stanley H. Brandes, to distinguish between institutional migration and transformational migration.

The inequalities not only refer to income and land distribution, they also have to do with social services, opportunities, and power in the way of political participation and representation. The relationship between central government and society has been basically centralised and hierarchical. In the Amazon there is still a strong clientelism, consequently the rule is the predominance of personal relations, in which the political power is derived from land ownership. A case in point is the prominent role played by the ranchers' unions known as Democratic Rural Union (UDR). Despite the fact that the Democratic Rural Union apparently decided to disband in an assembly in Brasilia in 1994, the UDR has been accused in recent years of violence especially against landless rural workers and farmers without documents (*posseiros*).[89] Lately clashes between members of the UDR and landless grouped in the MST have been notorious.[90] In 1999 the Ministry of Justice accepts the wide-scale arming of the Democratic Rural Union (UDR). According to the *Serviço Brasileiro de Justiça e Paz* (Sejup May 04, 2000), the president of the UDR, Almir Guedes Soriano, said that he will continue to defend lands of farmers and ranchers, even if it means using weapons. In a statement published by the *Folha de São Paulo* (May 03, 2000) he said:

"There is no doubt that many rural landowners are not going to put up with land occupations any more. And if these people enter into the wrong area, there will be conflict, and certainly blood will flow."

5.6 Final remarks

Two questions are particularly relevant to finish this chapter: *Can anything new be determined from the arguments presented in this chapter? Is this new information valuable for the research problem?* The information displayed in this chapter shows that the dynamic of the Brazilian Amazon is not only the result of intra-systemic elements (as a bureaucratic approach will state) nor only of supra-system ones (as the world-system theories will argue), but they are shaped to a large extent by the interactions between internal (system) and external (suprasystem) factors. In fact, a bureaucratic approach will focus on the role of the Brazilian State agencies in designing and implementing Amazonian policies. Indeed as I have shown state agencies such as SUDAM, FUNAI, SAE, INCRA, and IBAMA have played a prominent role in Amazonian development. However, once again the outcome in variables such as environmental change and allocation of resources cannot only be explained by looking at the bureaucratic structure.

World-system theory will stress dependency of the Brazilian State and the role of the world economy. Therefore, the Amazonian dynamic will be explained through its underdevelopment and dependency on the core. Even though part of the Amazon dynamic can be explained through this model, it certainly does not say so much, for instance, about changes in policies from nationalism in Sarney to co-operation with Cardoso. In addition, it does not provide any direct link with substantive attributes of the Brazilian Amazon such as maldistribution and population growth.

---

[89] In fact, according to information provided by Sejup, the Democratic Rural Union (UDR) decided to disband in 1994. The decision affects the organisation only at national level, since regional sections of the organisation will be allowed to continue. Deputy Ronaldo Caido, a founder member and leader of the UDR claimed that the decision was taken due to lack of mobilisation by the large ranchers.

[90] However, it should be said that most of the recent confrontation between the UDR and the MST has taken place in the southern part of the country, mainly in the states of São Paulo and Paraná. For instance, in 1997 The Democratic Rural Union planned the setting up of an armed militia to impede the occupation of ranches by the landless in the Pontal do Paranapanema region of the State of São Paulo. Several armed incidents have occurred there between 1997 and the year 2000.

From the above circumstances I argue that the system-suprasystem interactions better explain the current situation in the Brazilian Amazon. For instance, these interactions demonstrate why environmental matters have been to certain extent militarised. Thus, internally the Brazilian Amazon has been conceptualised as an empty and vulnerable space. Internationally, the Brazilian Amazon is presented almost as the common heritage of human kind, which has placed a set of international demands on the Brazilian Amazon. These interactions have provoked an increasing military concern over the Amazon. Thus, this situation directly contributes to the implementation of policies aiming to guarantee Amazonian incorporation into the national context, with the economic, social and environmental consequences previously discussed in this chapter.

In terms of the relationship between environmental issues and social conflict the system-suprasystem interactions have also played an important role. If one takes into account the five variables chosen in this study as potential sources of social conflicts, one realises that the outcome of these variables is determined by such interactions. For instance, what has to a large extent configured the outcome of environmental change has been the interactions between the *developmentalism* strategy in the Amazon put into effect by the Brazilian state agencies, and the lending policy by the multilateral institutions and some industrialised countries that have configured in great part the outcome of environmental change. Another example is found in the new progressive Brazilian environmental legislation. This is a system product in many ways because it has been designed and issued by Brazilian State agencies. However, it cannot be denied that it has been influenced by the international pressure from NGOs and some industrialised countries.

The latest example of system-suprasystem interaction influencing Amazonian dynamics is found in the implementation of the Pilot Program to Conserve the Brazilian Rainforest (PP-G7). The negotiation and implementation of this program can partially be understood within the debate over the internationalisation of the Amazon. As stated by Kolk (1998) throughout the preparation of the PP-G7 and its specific projects, the representatives of the World Bank, European Community and donor countries adopted a cautious approach in order to prevent particular sectors within Brazilian society and the government from being offended. This prudence was motivated by the concern that nationalist forces would characterise the program as another attempt to internationalise the Amazon. In short, it is by relating all these influxes that one can understand in a comprehensive way variables such as environmental change, allocation of resources, land distribution, population growth, and the legal system in the Brazilian Amazon.

PART C. RORAIMA AND PARA: SELECTED CASES TO UNDERSTAND THE LINKS BETWEEN ENVIRONMENTAL CHANGE AND SOCIAL CONFLICTS IN THE BRAZILIAN AMAZON

Aim and level of analysis

The aim of part C is to approach the research problem and the research questions in a more specific way by working with two case studies. As such, the states of Roraima and Pará have been selected as subsystems to be evaluated. This part is divided into three chapters: the first one deals with the state of Roraima, the second treats the state of Pará, and finally the third presents a comparative analysis of the case studies in order to provide an understanding of differences and similarities between both states.

The importance of Roraima and Pará is that they constitute subsystems of the whole system (the Brazilian Amazon), therefore it is my interest to unravel the most important patterns of their behaviour, rather than to present a detailed account of every single aspect of those two states. A central preoccupation of this theme is to bring a systemic perspective of the research problem, that is why I work with Roraima and Pará in relation to the whole Brazilian Amazon. Thus, it is from this perspective that Roraima and Pará should be evaluated, rather than studied from a pure detailed and isolated perspective.

The above theoretical and methodological consideration has two implications for the development of this part. First of all, it is vitally important to understand whether and how the system has influenced the behaviour of the subsystems as well as how the subsystems have adapted, transformed, or changed the general dynamics of the system. It should be remembered that very often the endogenous dynamics of the subsystems, have direct implications for the stability or instability of the whole system. Secondly, the objective of working with two cases is to find out whether there are differences or similarities between Roraima and Pará as case studies in relation to the previous analysis done in part C for the whole Brazilian Amazon.

CHAPTER VI. THE STATE OF RORAIMA

Structure of the argument

This chapter is divided in three parts. The first part deals with the historical configuration of Roraima. I will show how the most important elements shaping Roraima's history have influenced the socio-economic and environmental spheres as well as the configuration of social conflicts in this state.

The second part explains the performance of the four independent variables that have been chosen in this study. According to the independent variables selected special attention is paid to environmental change, distribution (mainly land), allocation of resources and population growth..

The third part attempts to understand the nature of the dependent variable in Roraima. In order to do this, I present a diagnosis of the main focus of social conflicts in Roraima, which are found in: the areas of Raposa/Serra do Sol, Waimiri-Atroari, and Yanomani.

6.1 Roraima: Location and constitution.

The state of Roraima is the newest in the Brazilian federal system as well as the northernmost part of Brazil. This area is equivalent to 2.6 % of the Brazilian territory, and 5.9 % of the northern region or classic Amazon. To the north and west lies Venezuela, to the east Guyana and the Brazilian State of Pará, and to the south-east, south, and south-west the state of Amazonas, to which Roraima has once belonged.

The southern region of Roraima along lower Branco River is densely forested, but the north-eastern region towards Mount Roraima and the frontier with Guyana is a natural open plain. A largely treeless savannah stretches from the upper Branco eastwards toward the Essequibo in Guyana. Its territory has an area of 230,000 square kilometres, more than four times the size of Costa Rica, and its territory embraces the entire basin of the Rio Branco, a tributary of the Rio Negro.

In 1943 Roraima was separated from the state of Amazonas by law as federal territory of Rio Branco. This law was aimed at bringing regions that were particularly underdeveloped under the control of the federal government. In 1964 the name of the territory was changed to Roraima for the reason that its original name (Rio Branco) caused confusion with Rio Branco, the capital of Acre, another federal state. Roraima became a Brazilian state in 1988. On the 1st of June, 1988, the *Assembleia Nacional Constituinte* approved a proposal that transformed the Territory of Roraima into a federal state. Finally on the 3rd of October, 1990, the first elections took place for the federal government as well as for the state parliament.

6.2 Historical background: An analysis of the past to understand the present

I claim that Roraima's history has been shaped by three factors: (i) territorial disputes, above all in the XVII century (ii) cattle ranching since the XVII century (iii) mining exploitation, basically gold.

6.2.1 International borders: Between calmness and unrest

The date of the initial exploration of the Rio Branco by Europeans is in doubt. Nevertheless, in the few historical references available about Roraima, it is generally accepted that during the XVIII century the first colonial settlement was Spanish. (Riviére, 1972 & Hemming, 1990). As Hemming points out, by 1773 Spanish soldiers had established two tiny fortified hamlets on the Uraicaá and Uraricoera rivers in the north-west of the region. These Spanish ventures occurred during the sixteen years when there was no treaty governing the

frontiers, considering that the Treaty of Madrid was cancelled in 1761. However, the Portuguese authorities on the Rio Negro reacted to this incursion by sending a force north to Rio Branco. All the Spaniards in Roraima were rounded up and a fort was later built to impose Portuguese rule, and some thousand Indians were persuaded to settle in villages under colonial control.

It is accepted that interest in the region close to Rio Branco resulted from one basic problem that faced the Portuguese colonists during the eighteenth century. This problem was the expansionist threat of the surrounding colonial powers (Dutch, English, and Spanish). As an example of this, in 1751-1752 the king of Portugal was petitioned to grant permission for the construction of a fort on the banks of the Rio Branco in order to prevent Dutch intrusion down that river.[91] It should be mentioned that the goal of the Spanish and Dutch incursions into Roraima had as a goal the discovery of *El Dorado*.[92] This was the legend of a native ruler so rich in gold that he would anoint himself with the precious metal in an annual ceremony on a great lake.[93] For instance, in 1714 the Dutch were approaching the Roraima region from the north-east. The Dutch West Indian Company sent an expedition up the Essequibo (Guyana) led by the commander Van de Heyden in order to search for Lake Parima, still the presumed location of the fabulous cities of Manoa *"El Dorado"* (Hemming, 1990: p.302).

In general, the Treaty of Madrid of 1750 fixed the boundaries between the Spanish and Portuguese empires and gave Brazil most of the vast territory it occupies today.[94] The negotiation of this treaty follows geographical features wherever possible. For the northern frontier eastwards from the upper Rio Negro, they followed the watershed between the Amazon basin to the south and the Orinoco to the north. According to Hemming (1990) this line was so unambiguous that Brazil's northern border with Venezuela and Colombia has never been in open dispute, making this one of the oldest peaceful boundaries of the world. Nevertheless, the real delimitation of Roraima's international borders came out in 1939, when *the Primera Divisão da Comissão Brasileira Demarcadora de Limites* finished the work demarcating the borders with Venezuela and Guyana, which in great extension was defined by the Orinoco and Amazon basin.

---

[91] The permission to construct the fort was given in 1752, but in the following year the local governor suggested that a regular patrol of the river from the nearest existing fort on the Rio Negro would provide adequate defence. It was not, however, a Dutch invasion that ultimately caused the construction of the fort, it was a Spanish one in 1775. The commander of the Portuguese force was ordered to construct the fort, and in his report of January 1, 1776 there is reference to the existence of such construction on the left bank of the Rio Branco, covering the mouths of the Uraricoera and Takutu Rivers.

[92] The first telling of this story was from a Spaniard called Luíz Daza in 1535. He claimed to have heard the story from local Indians describing the King of a nearby territory in New Granada (today Colombia). Similar stories soon began appearing all over Perú and Colombia, since the Spanish "*conquistadores*" had recently conquered the rich kingdoms in the "New World" (The Aztecs and the Incas).

[93] The lake was supposed to be called Manoa. Manoa is the word for lake in the Aruak language of the Achagua, although the name could be a corruption of Manao, a powerful tribe that lived on the middle Rio Negro, and were known for trading gold objects.

[94] In the later part of the Seven Years War, Spain and Portugal were on opposite sides, and the treaty of Madrid was annulled in 1761.

I would argue that it is not completely correct to affirm that these borders have never led to conflict. In one way it is right to say that violent conflict has not occurred, however, it is clear that some latent conflicts and political unrest have been experienced in the area. Thus, conflicts broke out lately (1991) when Brazilian *garimpeiros* were captured by the Venezuelan national guard in an area not clearly defined, and the situation was aggravated when Brazilian military aircraft flew through the same region. Moreover, in 1993 conflicts were experienced between Indians and *garimpeiros* along the borders, which provoked the intervention of the Venezuelan and Brazilian government.

In summary, as I have indicated, the first feature of Roraima's history has to do with border limitations. This preoccupation with frontier issues is clearly not over. As illustrated in the previous chapter (V), the notions of national security, sovereignty, and general geopolitical considerations still form a part of the current situation in the Amazon, and to a great extent, the border state of Roraima experiences such processes.

6.2.2 Ranching as a security measure

The second most important element of Roraima's history is cattle ranching. It was during the 1780s that the first cattle were taken up to Rio Branco to the grasslands of its headwaters. Ever since then, cattle have shaped Roraima's history. In 1798 a Portuguese traveller's account refers to three small ranches that existed in the region. According to Riviére (1972) the three ranches were probably *São Luis, São Bento, and São Marcos*, all royal property which formed the foundation of the cattle industry in the territory. These three cattle ranches were located near the three sides of the "*Y*" formed by the rivers Uraricoera and Tacatu, that merged together to become Rio Branco.

My way of looking at this early period of cattle ranching is that there was a direct link with the first feature of Roraima's history (territorial dispute). In fact, it seems that these three cattle ranchers had the purpose of assuring Roraima's territory to the Portuguese crown. This can be seen in the fact that all of them were royal property, meaning that they mainly played a security function of protecting this territory against Spanish incursions from Venezuela or Dutch and British from the Guineas.

There were apparently some references to Roraima as a land of fine grasslands, but nothing was done until Colonel Gama Lobo d'Almada, the future governor of the captaincy of Rio Negro, arrived in the region in 1787. He praised Rio Branco "Those fertile plains are covered in excellent pasture for cattle, studded with clumps of bush that would afford shade for the animals during the fiercest heat, irrigated by creeks which render them fertile and with innumerable lakes from which is drawn a quantity of mountain salt."[95]

Following the formation of the State of Amazonas in 1856, which at that time included Roraima, there was renewed interest in the cattle potential of the savannahs, and some effort was made to find a way of circumventing the river's rapids. As a result, since then this part of the Amazon has experienced a permanent increase in the size of its herds. The only reported exception to this increase in cattle prior to 1970 was between 1935 and 1945 when the herd size had become significantly reduced. According to Riviére (1972), there are two possible causes for this decrease. One was a particularly severe epidemic of rabies, and the other was the discovery of diamonds in the region, during which time the cattlemen deserted their ranches to become miners. The reason the ranches went searching for diamonds may well have been the consequence of the losses endured during the rabies epidemics.

[95] In Gama Lobo d`Almada "Descripção Relativa ao Rio Branco e sue Territorio" (1787), and cited by John Hemming in *Hispanic American Historical Review*, vol. 70, no 2, May 1990.

Another important aspect that influenced the development of cattle in Roraima was the rubber economy in the middle of the nineteenth century. The fact that the *hevea* tree is almost unknown on the Rio Branco allowed Roraima to escape the full impact of the rubber boom.

It should be said that ranching in Roraima does not just play an economic role but also a social one. The larger the amount of cattle the rancher has the better placed he is in economic terms. As Hecht (1985) mentions, cattle ranching has proved to be the most reliable way of raising and protecting capital in these distant lands. Ranching performs a personal security function too. Thus, today cattle are used as a means of protection against inflation, depreciation of savings, etc. In many cases they are also used as a simple mechanism for allocating financial resources for other business interests.

In conclusion, cattle ranching on the natural grasslands of the *cerrado* has been the lynch pin of Roraima's economy for over 150 years, and beef was one of the state's principal exports. Until the 1970s this became the principal non-indigenous land use in Roraima, thus replacing extractivism. Nevertheless with the beginning of the gold-rush in Roraima the importance of cattle ranching diminished. Finally, what is more important to see for analytical purposes is: the security function accomplished by ranching at the national level as well as at a personal level, and secondly, the strong links in Roraima between cattle ranching and mining. These links can be noted in the fact that the mining boom presented new investment opportunities for ranchers, but at the same time because of the social status the ranches generated, many new wealthy *garimpeiros* decided to buy ranches.

6.2.3 The emergence of "El Dorado"

The third and final element shaping Roraima's history is mining. As I have mentioned since the colonial period this part of the Amazon has been associated with gold, basically with the legend of *El Dorado*. Even though *El Dorado* was never found, gold, diamonds, cassiterite (tin ore), and radioactive deposits were discovered later. In the middle of Boa Vista, the capital of Roraima, there is a monumental statue of a *garimpeiro*, which shows how significant the gold mining activity has been in terms of the configuration of Roraima.

The first important event occurred in 1912 when diamonds were discovered in the Rio Maú. Nevertheless, it is not until 1938 that the production reached significant levels. According, one can see that by 1943 the mineral production consisting almost entirely of diamonds, represented nearly 60 % of the total production in this territory (Riviére, 1972: p.16). However, this amount dropped to 10 % in the 1970s. It is important to note the coincidence that diamonds achieved their greatest importance the same year in which the cattle herds reached their smallest size.

Since 1912 and more precisely since 1938, a number of diamond *garimpos* have been established along the rivers of the savannah, which drain from mount Roraima. Even though Roraima presents this long history of mineral extraction, there was no real understanding of the soil's richness until the program Radam-Brazil in 1970 did surveys in the area. The program suggested that Roraima's subsoil was of considerable economic value.

A notable change from diamonds to gold took place during the 1970s among the *garimpeiros*; the main reason for this was an economic one, since the shift corresponded with the rise in gold prices during the 1970s. As MacMillan (1995) states, because most of the deposits they mined have both minerals, it was not a difficult transition to make. Moreover, gold mining became even more popular in the 1980s when subsidies for cattle ranching were reduced and/or eliminated, and when the economic condition of the whole country was sharply affected by inflation.

Finally, I would like to mention two singular aspects of the mineral exploitation in Roraima. First, it is important to note that mineral extraction in Roraima has been carried out basically by the informal sector of *garimpeiros*. Secondly, most of the mineral fields are

located on indigenous land, which has provoked violent conflicts between *garimpeiros* and the Indian population. Nevertheless, the above elements are not exclusive to Roraima. Thus, there are *garimpeiros* all over the Brazilian Amazon, and at the same time it is clear that throughout the region *garimpeiros* have exploited deposits on Indian lands. In this respect the Kayapó of Pará, the Waiampi of Amapá, the Uru-eu-wau-wau of Rondônia, and the Tukano of Amazonas have all shared similar experiences. What is particular for Roraima is the intensity of both situations. In this sense the number of *garimpos* and *garimpeiros*, and the violent conflicts between them and the Indians have had a higher expression in Roraima that in most of the others Amazonian states.

In short, mining has had an influence and it is still an important factor in the development process of Roraima. The implications of mining activities have affected the other two historical variables that shape Roraima's current situation. I have already mentioned the conflictive border situation that is due to *garimpeiros* working in Yanomani lands on the Brazilian-Venezuelan borders, as well as the symbiotic relationship between *garimpeiros* and ranchers, in which ranchers have invested in *garimpagen* and wealthy *garimpeiros* have become ranchers.

6.3 Analysing the main independent variables affecting the dynamics of social conflicts in Roraima.

6.3.1 Environmental change: What makes Roraima a peculiar state within the classic Amazon?

The way of approaching environmental change will be by understanding the main ecological features of Roraima as well as by pointing out the main environmental threats that this state is facing, through analysing both situations within a regional perspective. This means thinking of Roraima as part of the Brazilian Amazon.

6.3.1.1 How do the different ecosystems influence Roraima's development?

Roraima is an interesting case considering that ecosystems faces similar problems as those found in the humid tropics. However, at the same time it has a significantly lower rate of environmental change in comparison with the percentage for the whole Brazilian Amazon. In addition, the study of the state has been poorly developed in comparison with the large amount of Amazonian literature.

As we know Roraima belongs to the so-called classic Amazon, which means that its ecosystems depend in many ways on the river basin. Roraima is the Amazonian state with the largest number of ecosystems, 18 in total (FMATR, 1994: p.87). Climatic, altitudinal, and topographic differences have influenced the variations in the ecosystems, resulting in: *selva tropical de terra- firme, pântanos, matas de várzea, várzeas de campo, campinaranas, cerrados, matas de encosta e de altitude*. A common factor is that all of them have had some kind of human activity, and therefore some level of environmental change can be assumed.

Although there are different subdivisions Furley and Mougeot (1994) have established seven main types of vegetation in Roraima, they are: Rio Branco grassland and Savannahs, dense montane forest, surumu savannahs, vegetation mosaic, which is a dense and open forest with shrub savannahs, dense forest of mid and low altitudes, open forest, and semi-deciduoud forest.

These types of vegetation can be divided in two categories: the forest ecosystem, known as *mata* including 83 % of the territory (186.030 km2) and the savannah area known as *cerrado* covering 17 % of the territory (38.102 km2) (Roraima, 1994: p.353). Even though *cerrados* represent a small percentage of the territory, Roraima possesses the most substantial tracts of

cerrado of the whole Brazilian Amazon.[96] The differences between the *mata* and cerrado *ecosystem* have had a strong influence in Roraima's development mainly in terms of colonisation, cattle ranching and agricultural practices. Thus, ranching is very different from one ecosystem to the other. To begin with, the holdings in the *mata* ecosystem tend to be smaller than those of the savannah, and are normally more intensive. Moreover, the social composition of ranchers in the *mata* is different, due to the fact that they are basically medium sized ranches (500-200 hectares), in contrast to the classic large landowner of the savannah.

In terms of agriculture, the *mata* ecosystem agriculture is mainly practised in an itinerant way and very much for small holders with the basic aim of family consumption (subsistence). Horticultural crops as well as fruit crops are often practised in this ecosystem. In those cases almost all production is undertaken on small holdings. The *cerrado* ecosystem presents a slightly different situation, since agriculture production is more for commercial purposes. In the 1970s the region began to undergo a process of intensive occupation that include the production of export crops and forestry projects.

6.3.1.2 From poor soils to the golden soil: The paradox as a source of conflicts.

In terms of its geological composition most of the state is dominated by the platform known as the *Guiana complex*. The significance of the geology in connection with the development in Roraima lies in its potential for mining exploitation. A number of important mineral resources have been exploited or have the potential to influence Roraima's development. This situation has significant input into the Roraima subsystem: first, mining exploitation became a notable factor of environmental change in Roraima, i.e. the utilisation of mercury has had important consequences on the natural environment, mainly the *garimpo* activities and their repercussion on river ecosystems and public health. Secondly, mining became the most important economic activity of the state. Finally, as a result of the economic boom, many of the new people coming to the state became agents of social conflicts, as I will show in the third section of this chapter.

Concerning soil properties, the only comprehensive survey of soil resources was carried out as part of *Projeto RadamBrasil.* From that project one can see that the main types of soil are the Latosols (Oxisols), and Red-Yellow Podzolic (Utisols), characteristic not just of Roraima, but of the Brazilian Amazon as we have seen in chapter V. Latosol is deep, intensely weathered, and usually very porous soils. Most soil can be characterised as dystrophic, that is, acidic with low nutrient reserves. The only soil with good potential for agriculture is the dark red Latosol to the west of Boa Vista. However, this group of richer soils only covers a limited area (less than 5 %), and the majority of Roraima's surface consists of the acid, nutrient-deficient soils typical of most of the Amazon basin (Furley, 1994: p.12). Podzolic soil is found along the basins of larger rivers. They are: clay-rich (found below sandy topsoils), acidic, highly susceptible to weathering and erosion, and is not usually considered appropriate for current agricultural practices. Other important types include hydromorphic, planosol, lithosol, concretionary, lateritic and alluvial soils.

In summary, those types of soil are with very low fertility, and most of them are poor acidic soils, therefore unsuitable for agriculture, ranching or forestry. This situation was confirmed in a new evaluation done in 1980 by the Ministry of Agriculture with the objective of land assessment (SEPLAN, 1990). This study argued that 43 % of the state was considered unsuitable for unrestricted agricultural use, and moreover just one % can sustain natural

[96] The area of *cerrados* corresponds to 25 % of Brazil's territory, it is situated mainly on the central plateau of the country. They fall in the international categories of savannahs.

pasture. However, it is also pointed out that over 57 % of the state was capable of supporting short and long cycle arable farming, assuming the use of appropriate fertilisers.

It is a paradox that the general poverty of the soil in Roraima when considering agriculture and cattle development, contrasts with the richness of the subsoil, in terms of mineral resources. It is generally accepted that an important amount of mineral resources has been exploited or has the potential to influence development. The problem is that most of the mining areas are located on Indian lands, which of course generates a process of social unrest between the competing social groups. A major area of gold exploitation is in the north-western of the Sucurucus regions in the Yanomani. Moreover, at times gold is found in the same location as diamonds (such as Fazenda Mina Seca, and upper reaches of the Maú and Cotingo rivers). Tin is also exploited in the Waimiri-Atroari Reserve in the south, close to the BR 174. Other minerals which have either been developed to a slight degree or are likely to assume greater importance in the future include further deposits of tin (cassiterite), agate, iron, aluminium, nickel conglomerates, manganese, sulphates, barytes, and rare, often dispersed minerals such as zircon, titanium, molybdenum and radioactive minerals (Furley & Mougeot, 1994: p.11).

In conclusion, my main argument here can be summarised as follows: To a certain extent, the combination of poverty and richness of Roraima's soils promotes social unrest. The web works as follows: Poor soil for agriculture, forestry and ranching promote settlement instability, and the need to look for other economic alternatives. This situation at the same time finds answers in the richness of Roraima's subsoil. However, it is faced with the problem that most of the mineral sites lie on official or unofficial Indian land. Thus, the above circumstances lead to territorial disputes for the exploitation of the Roraima's subsoil between Indians, *garimpeiros*, mining companies, cattle ranchers, and the local and national government.

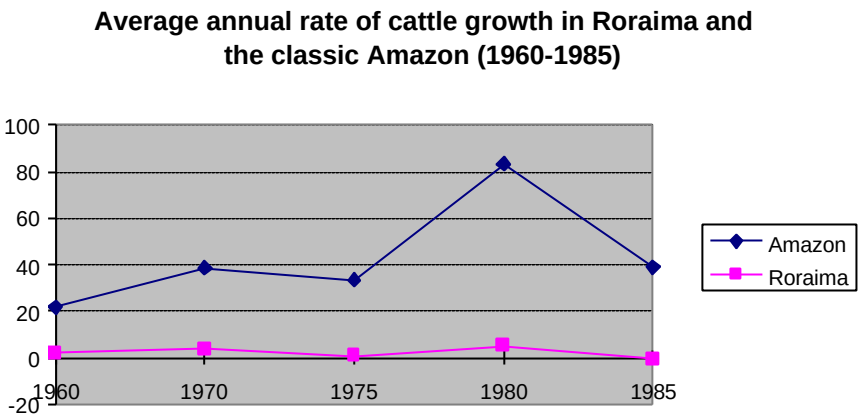
6.3.2 Main sources of environmental change in Roraima

The sources of environmental change in Roraima seem to follow the regional pattern found in the Brazilian Amazon. As such, the most important sources of ecosystem disturbances in Roraima are: (i) ranching (ii) the road network (iii) colonisation and agricultural schemes (iv) mining exploitation (v) urban expansion in Boa Vista and (vi) logging. The total outcome of the sources will be measured through the variable of deforestation due to the fact that this is the most important impact of the process of environmental change as well as the most visible one.

6.3.2.1 Ranching: the short-cut to environmental change and social conflicts

Ranching can be considered the most important source of environmental change in Roraima, even though the development of this activity is currently considered marginal in comparison with growth in the classic Amazon (see graph 4). One can illustrate the case of Roraima by saying that in 1780 the Portuguese established the state's first ranches on the northern savannah plains. During the course of the following century beef production became the principal non-indigenous form of land-use in Roraima, replacing extractivism. The traditional way of property division has also followed the regional dynamics, which means ranching families owning large expanses of the natural grasslands. For example, four politically influential families (Martins, Souza-Cruz, Brasil, and Mata) dominate the ownership of Roraima's savannahs (MacMillan, 1995: p.81).

Graph 4: Annual rate (%) of cattle growth in Roraima and the classic Amazon (1960-1985)



Source: Agricultural census. 1960, 1970, 1985, and Scheneider (1995).

Looking at the evolution of cattle ranching in Roraima (graph 4) one can see that the increase of the annual rate has not been dramatic, changing from 1.8 % in 1960, to 3.6 % in 1970, 0.6 % in 1975, and 4.9 % in 1980. Finally negative growth had been experienced in 1985 (-0.7). The negative tendency seems to continue, as Macmillan & Furley (1994) based on SUDAM data have stated, that from 1980 to 1991 the number of cattle has declined from 360.000 to 220.00, representing a 38 % drop over the decade. In contrast, the average in the Amazon has been higher as can be seen in the graph 4. The dramatic increase in 1980 in the Brazilian Amazon is explained partially by the enormous growth in the state of Rondônia (30.3 %).[97] In general the development of the ranching sector in the forested areas of southern Roraima has been basically associated with the road construction, mainly alongside the BR-174, which in a way follows the regional pattern for the whole Amazon promoted by the *Planos de Integraçâo Nacional* (PIN).

In Roraima an important distinction has to be made in terms of cattle ranching in the northern *cerrados* and in the *mata* ecosystem. Even when ranching in the ecosystem of *mata* and *cerrado* have clear consequences in terms of modification of the environment, ranching in the forest is more ecologically damaging, since the tropical forest is destroyed and replaced by artificial pastures. Moreover, the process of ranching is followed by soil degradation, which normally stimulates the abandoning of land. Ranchers are obliged to clear new areas to ensure grazing for their herds. In addition, ranching in the *mata* is more intensive. On the contrary, in the *cerrados* the long savannahs represent a huge area for free grazing. Thus, an extensive ranching system has evolved to exploit this situation profitably, requiring minimum investment in both capital and labour.

Looking at the development of ranching in Roraima in comparison with the whole basin, it is possible to perceive that during the period of tax incentives and tax exemptions for cattle ranching in the Amazon, Roraima was one of the states with the lowest amount of fiscal incentives. In that sense only six of Roraima's largest ranches received SUDAM grants and most of these were already in existence prior to the *Polamazonia* initiative. Corporate finance was more easily drawn to the southern and eastern Amazon, where better communications

[97] The value for the classic Amazon is as follows: In 1960 (21.6 %), 1970 (38.5 %), 1975 (33.3 %), 1980 (83.5 %) and in 1985 (38.8 %).

linked the ranching economy to the principal domestic market. The above element is important in order to understand intra-systemic differences in the Brazilian Amazon. For instance, the rural violence that has traditionally accompanied ranching in the southern Amazon was not experienced to the same degree in Roraima.

In conclusion, ranching has created a recognisable contribution to environmental change as well as to social tension. This is mainly evident in the *cerrados* region. For instance, in northern Roraima the Macuxi and Wapixana contest the ownership of natural grassland with well-established the ranching elite. However, in the southern part of Roraima, the competition for land is less fierce, so rural violence in this forested part of the state is low by Roraima's standards and even lower by Amazonian standards.

6.3.2.2 Road construction in Roraima and the everlasting objectives of national security and national integration

It could be claimed that road building is the most relevant factor accelerating Roraima's transformation, because it ended Roraima's isolation from the rest of Brazil. This can be seen by the fact that the most serious constraint on the growth of Roraima's cattle industry was transportation. The region had no roads, only trails, and ranchers relied on moving their animals by river. The only road route for cattle export to Manaus was down the Rio Branco.

The construction of roads in Roraima has to be placed in the context of PIN 1 as well as the *Polamazonia* program. *Polamazonia* was the program for agro-ranching and agro-mineral development poles in the Amazon. In this sense, half of Roraima was identified as an economic growth pole, and therefore funds were allocated to stimulate its expansion through the Amazonian Development agency (SUDAM). This program was outlined specifically for Roraima to support the construction of the BR-174 and its associated colonisation projects, to develop the ranching sector, to research mineral resources, and to expand trade with Guyana.

My main argument is that even though road building has stimulated the development of mining and colonist agriculture, I argue that in the case of Roraima security was the main motive behind highway network. In principle it should be said that expansion of the highway network embodied geopolitics that sought to occupy remote parts of Brazil and integrate them within the national economy. To fulfil such objectives, the BR-174 highway was constructed between Manaus and Boa Vista, and later work began on the northern perimeter highway (BR-210). An example supporting the point and defended here is the implementation of the *Calha Norte* project in which one of the basic tools to accomplish it was to improve communication.[98] The road construction and the security imperatives associated with it not only transformed the landscape and contributed to assuring a major control over this area, but moreover they transformed the structure of the local economy as well as social relationships among the groups affected by such dynamics.

The first big project started in 1970 with the construction of the 775-km BR-174 linking Manaus to Boa Vista. It took seven years to build 624 km of unpaved highway from Manaus to Caracaraí, where the new road joined the existing BR-174 for 346 km to Boa Vista and the Venezuelan border. The BR-174 was formally opened in April 1977. A serious problem arose because the most direct route for the road ran across the territory of the Waimiri-Atroari tribe. This Indian tribe had fought longer and harder than almost any other Brazilian tribe to preserve its independence and territory. The BR-174 now crosses 120 km of the Waimiri-Atroari Reserve, and this is the only stretch of this road that is flanked by virgin forest. The tribe is now pacific, reduced in number, and is undergoing a process of acculturation, via

[98] This is expected to increase bilateral relations.

three FUNAI posts in its land (Hemming, 1990: p.36). The paving of the BR-174 also contributed to a minor extent to promote trading between Brazil, Guyana, and Venezuela.

Another completed road link is between Georgetown and Boa Vista, constructed by the Brazilian group Paranapanema at the invitation of the Guyanese government. Paranapanema is a mining company that has operated in Roraima. Thus, communication between the two countries is increasing. Moreover, pressure to pave the 194-km BR-401 from Boa Vista to Bonfin has increased too, now that the Guyanese road between Lathen and Georgetown is passable.

Finally, the unfinished BR-210 *Parimental norte* should be mentioned. This road was supposed to run along the northern part of the Brazilian Amazon. Its main purpose was to act as a feeder corridor for colonisation. It is mentioned that no fewer than ten towns were established along the BR-210, functioning as service centres for pioneers and travellers, like São Luis do Asnaua, São Joao da Baliza, Caroebe, and Entre Rios. As can be noted, the main impact of this unfinished road has been the attraction of settlers to the state. In addition, the BR-210 cut the Indian land of the Wai-Wai in its eastern part, consequently altering the way of living of this Indian population.

In conclusion the BR-174 as well as the BR-210 were driven into the heavily forested *terra firme* areas, which have been a refuge for Roraima's Indian societies. The consequences for the Indian communities are presented in most of the literature as highly negative.

6.3.2.3 Colonist agriculture: The relationship between environmental change and social needs

I present colonisation schemes and agricultural development together in this section based on the assumption that both activities have been highly related in Roraima. It was mainly in the 1970s and 1980s that agriculture in the Amazon began to be supported by government initiatives on a large scale, a good example being *Polonoroeste.* As I have alluded before, most of the programs related to distribution of plots of land in the Amazon basin, have as a background the poverty of million of Brazilians. Thus, this has for many years been the mechanism used by the Brazilian governments to defuse social tensions in other areas. The number of *nordestinos* involved in these programs has been significant.[99]

A historical overview will tell us that Roraima's first colonisation projects were established by the state government agricultural secretariat in the 1940s and 1950s. Hemming (1990) argues that this was a response to the food scarcity problem faced by the territory of Rio Branco (Roraima) in 1951-1952.[100] The basic reason for implementing these agriculture colonies was first of all to make the region self-sufficient in basic foods. Moreover, Hemming (1990) adds that this policy was also designed to attract immigrants to a very tiny part of Brazil.[101] Dispite the above objective, at the beginning of the 1970s much of the state

[99] For instance in Roraima the largest proportion of colonists arriving were from the north-east. Thus, settlements established before 1980 tend to be dominated by migrants from Maranhão. These include some of the more recent state government programmes like Alto Alegre (1978), and the earlier INCRA schemes created along the BR-174, like PAD Anauá (1979). However, most of those migrants had a long history of migration as it was shown in a study done by SUDAM in 1984. So, according to the study 62 % had moved three to five times prior to the arrival in Roraima.

[100] The problem of food shortage became so acute during that period that the Governor had to appeal to the Brazilian Air Force for an airlift of rice, manioc, corn, beans and sugar.

[101] This can be seen in the fact that the first batch of settler families in these new colonies came from the north-eastern state of Maranhão.

remained inhabited by a number of indigenous groups, a situation still characteristic of the southern and western areas where dense forest and heavy rains make agricultural settlement difficult.

This landscape started to change during the 1970s. Thus, in 1975 the federal government land agency INCRA was established in Roraima to regulate land titling in the state and to administer the colonisation of the BR-174 and BR-210 highways. As a result, recent expansion of agriculture has occurred along the BR-174 in the southern part of Roraima, and BR-210 *Parimental norte.*

It is clear that in the Amazon basin most settlement projects have been established along the main highways. In this sense Roraima seems to follow the regional dynamics. The logic of colonisation in Roraima works as follows: migrant families are typically allocated to 50-100 hectare plots of forested *terra firme* land, which are connected to highways by dirt feeder roads. Normally those migrants invest minimal amounts of capital to grow rice, maize, manioc, beans, bananas, black pepper, coffee, and sugar cane (MacMillan, 1995: p.20). Looking at the present situation, Roraima has most of its agricultural areas intact. According to a study done by the Fundaçaô Meio Ambiente e Tecnologia de Roraima (1994) from the total area of Roraima (224.131.3 km2), 55.230 km2 has some level of potential agriculture. However, of this total agricultural land the different municipalities have used only a minimum percentage. For example the *municipio* of Boa Vista has only utilised 3 %, Bonfin 1.5 %, Alto Alegre 2 %, Mucajaí 2.5 %, São Luiz 1.5 %, São Joâo de Baliza 1.5 %, Caracaraí 0.5 %, and Normandia 1.0 %. That means that the level of idleness is around 97 % (Roraima, 1994).

Despite this agricultural potential described in the study by the *Fundaçaô de Meio Ambiente e Tecnologia de Roraima*, agriculture in general has been a weak phenomenon in Roraima. Among the main reasons are the environmental factors as well the predominance of cattle ranching. The development of arable crop production have been limited by factors such as poor soils, unfavourable climate and swamp or seasonally flooded terrain. The above situation could be explained by the fact that such soil is not highly suitable for agriculture, so according to the data that I presented, close to 40 % of the area is unsuited for any form of agriculture under present conditions and knowledge. Poor soil is a constant problem in the Amazon basin and Roraima is no the exception. It should be remembered that fertile Alfisols soil only represents a very small part of the soil in Roraima. Most of the problem in this sense has been the location of colonist agriculture programs in Utisols and Oxisols. These limitations have led to a situation where food imports from southern Brazil and, to a lesser extent, from Venezuela are required. In relation to the predominance of cattle ranching there is a historical reason, namely that Roraima's economy has been dominated by ranchers, so traditionally the *fazendeiros* have been too conservative to grow crops.

In addition, there are other factors contributing to making agricultural development difficult in Roraima, particularly for the small-scale farmer. The most predominant factor being the isolation of the state, which has contributed to the slow pace of agricultural development, the relatively small size and vulnerability of the consumer market, lack of capital and initial resources by immigrant settlers, difficulties in obtaining land tenure or even access to available land (and therefore opportunities to obtain credit), periodic labour problems, and finally the inadequacy of technical assistance (Barrow & Paterson, 1994: p.165).

To illustrate the above considerations between 1985 and 1990 there was a 35 % decrease in the area planted under annual crops while the population increased by 73 %. This reduced the index of hectares planted per head by 63 % over the same period (data from the secretary of Agriculture, Boa Vista & SUCAM. In Macmillan & Furley: 1994, p.194).

As Furley (1994) has argued, the prospects of a significant improvement in agricultural production in the state can not be viewed optimistically at present due to the existing financial

situation of the country, as well as the local problems related to environmental limitations, present infrastructure, market conditions, land zoning and titling policies. Hence, many of the smallholders and colonists in both *mata* and *cerrado* ecosystems have the option of clearing the forest even further or leaving the land for the centres of population in the hope of better employment, as well as getting involved in activities such as mining, many of them becoming *garimpeiros*.

An additional point that I want to develop here is to show that forest clearance is a crucial element in the adaptive strategies of survival for the population in Roraima. In this sense the subsistence crops play an important role, normally they are grown in areas of cleared forest. As is indicated by Mougeot and Leña (1994). In Roraima, rice is mostly the first crop to be planted in a sequential system, followed by maize, and when that is already established, beans and manioc.

An interesting connection can also be established between *garimpo* activities and colonist agriculture. This link is base on the fact that production throughout the state is very seasonal, reflecting the prevailing climate. This fact presumably led to smallholder participation in the *garimpos*. Thus, the seasonal demand for labour in the *garimpos* is the opposite of the period of growth and harvest of rice, maize and beans. In the first case, even when the *garimpos* can mine all year long most of the activity is done during the dry season. Once the rain stops it becomes increasingly easy to recover gold when the high water levels recede. On the other hand, rice, maize and beans are tended for about five to six months until the end of the wet season.

To finish the evaluation of this source of environmental change I want to mention the implication of agricultural development in terms of environmental change. The main disruption due to agricultural development has taken place in the *várzea* ecosystem, mainly due to rice production. Thus, most of the rice is produced in the *várzea* area, which coincides with the fact that 25 % of the *várzea* disappeared between 1978 and 1985. It seems to be that where natural resources have been more depleted farming conditions are increasingly risky and demanding.[102] Analyses show how soils can deteriorate dramatically even in fertile ecosystems such as the *várzea* area, once the forest cover has been removed.

In summary, even though the rate of deforestation due to agricultural colonisation is not high by Amazonian standards, the state government has been publicising grain production schemes with direct repercussions on the influx of a large landless population, resulting in degradation of forested areas. Moreover, the pace of agricultural colonisation by smallholders has accelerated with the expansion of the local road network.

6.3.2.4 The mining sector: How much environmental change can be attributed to mining?

It has been noted before how the myth of *El Dorado* has influenced colonisation as well as exploration of the Amazon. As Roraima is close to Guyana, (one of the places where the famous ruler was supposed to live), numerous travellers go across the savannah plains of the Guyana shield in search of mineral wealth.

I pointed out at the beginning of this chapter that one of the main features of Roraima's development is mining. In fact, very much of the Roraima's recent development has been shaped by this sector, perhaps not that much in the sense of the returns from mining

[102] Taiano provides a good example of this situation. There the forest was totally parcelled out in lots of 30 hectares each some thirty years ago, through a state-sponsored agricultural scheme. It has now been almost totally cleared (82.8 %). Remnants are only found today on a few escarpments or at the far-end of roadside plots, abandoned due to repeated rice-crop failures as a result of successive droughts in the early 1980s (Lima 1984).

prospecting entering Roraima's official taxable economy (due to the fact that gold and diamonds are easily smuggled), but in the sense of the alteration of the social and economic configuration in Roraima. In this latter sense, the large number of migrants becoming *garimpeiros*, as well as the fact that smallholders and ranchers have become involved in the mining sectors, represent a change in Roraima's social structure.

As I have already mentioned, the discovery and early development of the mining sector in Roraima began at the beginning of the century (1918-1920), but its development started two decades later. The important aspect now is to measure recent events against this historical background and recall that only a fraction of the state's diverse mineral potential has so far been exploited. As indicated by MacMillan (1995), this is because the virtual halting of the 1987-90 gold rush was a result of political pressures, and does not reflect a substantial depletion of resources. In fact, the exhaustion has taken place basically in the old alluvial mines of Tepequén and the Rios Maú, Quinó, and Cotingo.

I divide the social environmental impacts of mining in Roraima in two different categories, the direct and indirect. In the first case (direct) most mining operations are situated on or next to waterways, which have a disproportionately large impact on the riverine ecosystem. First of all, as Douroujeanni and Padua (1992) mention, sedimentation of waterways is the most significant of all the environmental costs attributable to *garimpagem*. This not only interferes with the reproduction of fish, which is an important food source in the Amazon, but also accelerates the rate at which the reservoirs of certain hydroelectric projects silt up.

The widespread extent of mercury contamination implies a direct impact on public health. Although *garimpeiros* are increasingly aware that mercury is highly toxic, it is still common to see a group of people huddled around wherever the gold-mercury amalgam is torched.[103] The problem is that the use of mercury is regarded as important in the running of a successful operation. Many *garimpeiros* agreed that *garimpagen* without mercury is theoretically possible, but argue that it would result in a sharp drop in recovery rates and therefore result in more work, since material would have to be passed through the machinery several times more to compensate (Cleary, 1990: p.226).

A second and potentially more serious channel of mercury contamination happens via the consumption of polluted fish. With the constant flow of water and sediments some of the mercury placed behind the riffles in the *garimpeiros* sluice-boxes is washed into the local waterways. It settles amongst the sediment of riverbeds, where it is joined by mercury that has been condensed out of the atmosphere with rainfall. Ground-feeding fish and other organisms absorb the mercury on the river bottoms and they, in turn, are eaten by carnivorous fish. In the course of these events the mercury is transformed from an inorganic to an extremely toxic organic state called methyl-mercury, this happens through a process known as methylation (MacMillan, 1995: p.159).

It is clear that riverine communities in close proximity to the *garimpos* are at greatest risk from mercury contamination through fish consumption. In the case of Roraima very little is known about mercury pollution of rivers. However, it has been pointed out that rivers such as Uraricoera, Parima, tacutu, Maú, Cotingo, Quinó, Mucajaí and Anauá have presented some level of mercury pollution.

Concerning public health, in one of the few analyses done, Castro, Albert, and Pfeiffer (1991) did measure the concentration of mercury in hair samples from the Yanomani population. The result was compared with the maximum permissible concentration

[103] People who inhale mercury form the burning process absorb the metal in an inorganic form through the mucous membranes of the nose and lungs. While undoubtedly toxic, mercury in this inorganic state may be flushed out of the body and discharged with the urine.

established by the World Health Organisation. In this case was observed that the main pathway of contamination in the Yanomani population was through the food chain since only very few male Indians participate in the gold mining activities. The mercury was determined in hair samples from 162 Yanomani Indians that were hospitalised in Boa Vista. The Indians came from three different areas strongly affected by gold mining activities, namely Surucucus area, Paapiu area, and Mucajai River.

The second category of mining effects on environmental change is represented by indirect impacts. In this sense it is clear that the impacts of mining in the terrestrial environment is considerably less. Mining is not a major force causing forest clearance, rather it is concentrated in Roraima in small areas. Therefore, it does not contribute directly to widespread deforestation. However, MacMillan found (1995) that mining and especially *garimpagen* contributes to deforestation in an indirect way. It has been proved that much forest clearance has been financed by profits from the *garimpos* in the sense that many *garimpeiros* have invested their profits in farms in Roraima and/or other Amazonian states, especially in Pará.

One could think that mining incomes could be somehow controlling the beef economy now that many of the government subsidies for ranching have been withdrawn. In this way, *garimpagen* may have important repercussions on patterns of deforestation, land tenure, and agrarian violence, which extend far beyond the site of mineral extraction itself.

Another indirect way in which mining activities have influenced environmental change is through the infrastructural changes. In this sense, the major participation is not by *garimpos* but by the formal sector. The most well-known case in the Amazon took place in Pará, where in the 1980s the mineral corporation CVRD constructed a 900 km railway to transport iron ore from the Serra do Carajás to a deep-water port in São Luiz. In Roraima a case in point is the mining company Paranapanema which has built roads into the Waimiri-Atroari reserve to gain access to the pitinga cassiterite mine.

Finally, mining has contributed to environmental change through the rapid expansion of cities in the Brazilian Amazon, in the case of Roraima, Boa Vista is an example. Other towns include Santarém and Marabá in Pará, Porto Velho in Rondônia. In this matter, the contribution of *garimpeiros* has been higher than that of corporate activities. The reason for this is the fact that *garimpeiros* tend to spend most of their income in the local economy, while the formal mining sector tends to take away the profits from the region and invest somewhere else.

In conclusion, the contribution of the mining sector to environmental change is produced both directly and indirectly. However, it can be argued that the magnitude of its effects is far lower than those produced by cattle ranching and agricultural colonisation. Nevertheless, its impacts on the social dynamics are highly significant, as I will show in the third part of this chapter dealing with the nature of social conflicts in Roraima.

6.3.2.5 Dams. Is Roraima part of the hydroelectric boom of the Amazon?

As I indicated in part C, dam building is today one of the most important mechanisms contributing to the imperative of industrialisation. Most of Brazil's hydroelectric potential is located in the Amazon region, which holds an estimated 97,800 MW. By late 1984 the federal power utility holding company's subsidiary for northern Brazil, *Centrais Eléctricas do Norte do Brasil* (ELETRONORTE), had identified some 63 sites for hydropower-generating reservoirs in the river Araguaia Tocantins basin and along the major tributaries of the River Amazonas; if all were exploited, these would flood about 100,000 square kilometres (Junk and Nenes de Mello, 1987: p.367). The most important plan for hydroelectric development is the so-called 2010 plan released in 1987. This outlined 31 hydroelectric dams to be constructed in the classic Amazon.

In Roraima, the construction of dams has not experienced the same development as in other states such as Pará and Amazonas. Diesel-burning generators currently supply urban demand for electricity in Roraima. With existing equipment Boa Vista can produce 80 megawatts of electricity, a capacity that considerably outstrips its current demand of 30 megawatts (MacMillan & Furley, 1995: p.199). In spite of this, two potential hydroelectric projects are planned, to ensure that future growth of Boa Vista and other urban centres is not limited by electricity shortage, at least this is the official version of *ELECTRONORTE.* Nevertheless, as I have pointed out before, much of this project could be associated with the need of energy for other mega projects, as well as the need to increase the transfer of energy between regions in Brazil, in order to support the industrialisation efforts of the country.

Consequently, survey work has already begun at the side of the Rio Jatapú, where four turbines of 2.5 megawatts are to be installed. This scheme is significantly larger than that originally planned to meet the energy needs of the southern part of the state. In the Cotingo basin a controversial project is supposed to take place, where the financing of a 150 megawatt plant by the World Bank is under consideration. Conflicts in this area have increased between the Makuxi Indian population and the military policy due to Indian opposition to this construction. The building of a power station at the Cotingo River, according to the taw, depends on the authorisation of the National Congress as well as on the consent of Indian communities who live in the area. The main impact will be on the Makuxi indigenous area of Raposa/Serra do Sol. According to some estimates the power station could inundate an area of 16 km2 of *cerrado* vegetation. Though this is a small area, its potentially high social impacts on the daily life of the Makuxi population should be considered.

By 1995 the governor of Roraima was one of the few supporting the project, because even ELETROBRAS, a state-owned company, advised against it, and the DNAEE (National Water and Power Department), an agency of the Ministry of Mines and Energy, did not approve the lease required for exploiting the river for such a purpose.

To summarise my argument, I state that even though Roraima is presently quite integrated into the conception of using hydropower to promote industrialisation, it has not been fully integrated into the Amazon dam boom, possible because of the state isolation from the main urban centres.

6.3.2.6 Logging: The Venezuelan contribution to environmental change in Roraima

The final source of environmental change to be evaluated is timber exploitation. Traditionally, timber has not been the most important aspect of Roraima's economy. This is explained first by Roraima's traditional isolation from the rest of Brazil, at least until the BR-174 was built, and secondly, because in comparative terms timber resources in Roraima are poorer than those found in other Amazonian states. However, during the late 1970s and early 1980s, the economy was saved by timber exports. These were boom years for the Venezuelan construction industry, which discovered that the best wood for scaffolding and concrete formwork was a smooth, white softwood called *caferena* (see table 9). This tree grows in abundance near the Bem-querer rapids and Caracaraí. Modern sawmills were developed to meet this demand, and the timber moved north along the BR-174 link to Venezuela. By 1980, timber exports had taken over from beef and cattle as Roraima's largest export. But this raw material is dependent on market forces. Thus, with the collapse in oil prices in 1986, and the Venezuelan economic crisis, demand for Roraima timber decreased (Hemming, 1990: p.38).
According to the program *Zoneamento Ecológico-Econômico de Roraima* (ZEERR), the areas with timber potential in Roraima are: Trecho Caracaraí in the border with the state of Amazonas, Ligação Confianca-Gleba Novo Paraiso, and the western section of the *Parimentral Norte.*

Table 9: Volume and destination of Roraima´s timber export in 1991

Timber	Volume (meter cubic)	Country of destination
Samaúna	997,376	Venezuela
Timburi	37,145	Venezuela
Cedro	10,720	Venezuela
Mogno	58,800	Venezuela
Louro Vermelho	38,000	Venezuela
Casca Grossa	20,000	Venezuela
Muiratinga	16,000	Venezuela
Total	1,178,041	

Source: DFARA/RR (Diretoria Federal de Agricultura e Reforma Agraria).

In conclusion, I would argue that in terms of environmental change, logging is not a leading factor. On the contrary, it has been a marginal factor saved in the 1970's because of demand from a wealthy Venezuelan economy.

6.3.3 Evaluating the outcome of environmental change: How significant is deforestation in Roraima?

As I mentioned at the beginning of this section all the ecosystems in Roraima have experienced some level of human intervention. The first and most visible manifestation of environmental disruption is deforestation. The current extent of deforestation in Roraima is relatively low, and definitely one of the lower rates of the Amazon basin, but it has increased rapidly in recent years. Due to the relatively recent and limited character of forest clearance in Roraima there is presently little evidence to illustrate environmental impacts. The general effects however are likely to be similar to those reported from parts of the Amazon where more substantial clearance has occurred.[104]

The situation of forest depletion in Roraima is relatively favourable in the sense that the scale of forest clearance is currently less than in most of the Amazon basin. Looking at the main data on Amazonian deforestation, it is evident that there is an implicit consensus that the level of deforestation in Roraima is not higher than 2 %. For instance, according to May & Reis (1993) the total area deforested by 1991 was 1.81 % in comparison with 8.68 % for the whole legal Amazon. However, due to the huge forest fire in 1998, when around 14 % of Roraima's lands were affected, increase in deforestation is expected. The spatial distribution of the fires during 1998 was between 62 and 75 % in the savannah and only between 0.5 to 1 in the dense forest. In the graphs 5 & 6 it is possible to note that since 1978 there has been a constant increase in the number of km2 deforested annually. Nevertheless, the rate of deforestation increase in Roraima has not been constant over the whole period evaluated here.[105] For instance from 1978 to 1988 there was an annual growth of 0.18 %. However, in 1989/90 it went down to 0.10%, but increased again in 1990/91 to 0.27 %, and finally it is

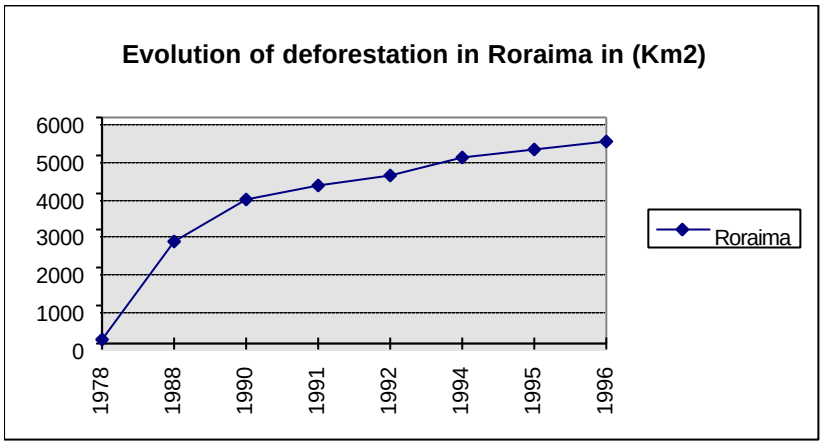
[104] Among these areas one can cite: Eastern Pará, Northern Mato Grosso, along the TransAmazonian highway in Central Pará, along the Vilhena-Pôrto Velho highway in Rondônia.

[105] The evolution of deforestation in Roraima is in km2 as follow: 100 in 1978; 2700 in 1988; 3800 in 1990; 4200 in 1991; 4481 in 1992; 4961 in 1994; 5124 in 1995; and 5361 in 1996.

lower for the remaining period: 1991/92 (0.18 %); 1992/94 (0.15 %); 1994/95, and 1995/96 (0.14 %). The other conclusion made from the graphs is that the annual rate is considerably lower than the average of the whole legal Amazon.[106]

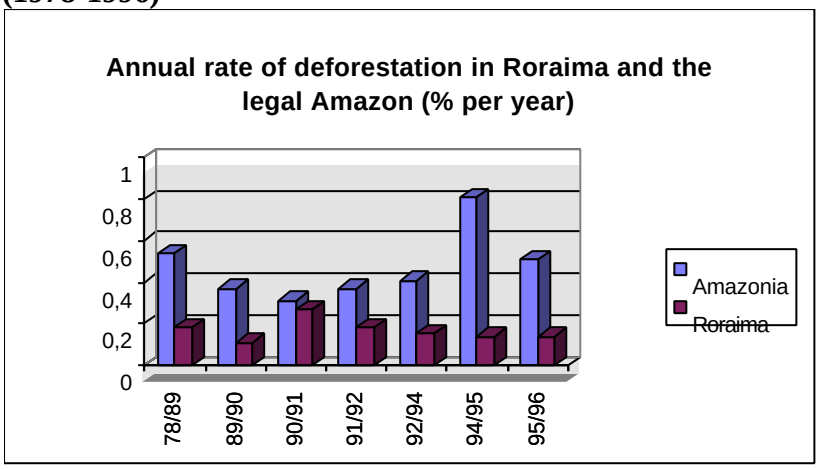
The spatial distribution of deforestation in Roraima basically affects the dense forests of southern Roraima, particularly along the major highways (BR-174), but it has also moved rapidly into the scattered woodlands and forest-savannah transitions which characterise much of the northern part of the state.

Graph 5: Roraima's deforestation growth in km2 (1978-96)



Source: INPE. Brazilian National Institute for Space Research. *Http://www.inpe.br/amz-04.htm*

Graph 6: Deforestation growth in Roraima and the legal Amazon. Percentage per year (1978-1996)



Source: INPE. Brazilian National Institute for Space Research. *Http://www.inpe.br/amz-04.htm*

[106] The annual growth for the Legal Amazon is 0.54 (1978/89); 0,37 (1989/90); 0.30 (1990/91); 0.37 (1991/92); 0.40 (1992/94); 0.81 (1994/95), and 0.51 for the period between 1995 and 1996.Extra space!

6.4 Socio-economic dynamics in Roraima and its contribution to social stress

6.4.1 Roraima: Distribution and allocation

Roraima does not escape the general tendency of poverty, social exclusion, and inequity that characterises the whole Brazilian Amazon. The Brazilian Amazon, as was pointed out in chapter V, can be characterised by a sharp social duality, in which most of the population is excluded from the majority of political and economic benefits generated by the system (Riordan Roett, 1992: p.36). In this sense there is a notion of continuity in Roraima, because as it is revealed by economic indicators, Roraima presents a high level of land concentration, poor participation of the *Roraimanses* in the political processes, and a general exclusion of a large sector of the population due to the influential role of the *elite.*

In relation to the variable of distribution it is possible to perceive in Table 10 and Graph 7 no significant differences in relation to the Brazilian Amazon. In fact, the GINI coefficient shows a clear problem of land concentration, which is corroborated by the data from the *census agropecuário* in 1985. This data shows that the largest five % of the total farms owned 53.5 % of the total land, while 50 % account for 7.5 % of the land in Roraima. Nevertheless, it is important to note that when it comes to the number of people living in extreme poverty in Roraima, the numbers are far smaller than for the rest of the classic Amazon state. In Roraima, according to Peliano and quoted by Choji (1994), 2.849 people are registered in these conditions in the urban areas, which constitute only 3.26 %. This contrasts with other states such as Pará (16.70 %), Rondônia (13.54 %), and Acre (20.65 %).

One of the factors explaining the above situation could be that the frontier mechanism did not operate extensively in Roraima. As I have shown, the concept of frontier can not be fully applied to Roraima, therefore one can think that the proletarisation process did not occur in Roraima to the same extent that id did in other states, since Roraima was not atypical frontier area. In that sense, it is interesting to note that in some literature Roraima is cited as a backward state, or a state remaining behind in development, forgetting that maybe the absence of the traditional pattern of economic growth experienced in other Amazonian states is part of the explanation for the small amount of indigent people in the urban areas of Roraima.

As I will show in the next section land access and land ownership have not been the main sources of conflicts in Roraima, even when the concentration of land is very high, as can be seen from table 10 and also graph 12. Once again this has to do with the fact that Roraima has not been entirely affected by the frontier dynamics. For instance in states such as Rondônia, Pará, Marahâo, Mato Grosso, Tocantins, and Goias, conflicts arose when migrant farmers, who have either allocated land in government colonisation schemes or who had simply staked a claim to unoccupied landholdings, clashed with large ranching or agro-mineral projects, many of them receiving government support in the form of tax breaks. The above situation has not been registered often in Roraima. Thus, the violence and deforestation, which underlined this struggle for land were mostly distinguishable in the other aforementioned states. As MacMillan (1995) points out, Roraima was virtually unaffected by this dynamic, because, among other reasons, it was too remote to attract venture capital in the same way as the southern Amazon did. In this sense the lack of land conflicts in Roraima is notable in comparison with the whole Amazon.

Finally, Roraima does not differ from the rest of the Amazon when it comes to the land tenure problem. According to Zimmermann's report (1973), of the 1953 mixed arable and ranching enterprises registered in 1970, only 132 properties with an area of 506,902 hectares possessed a definite title. Therefore, 93 % of the farms occupying around three-quarters of the land possessed no documentation to guarantee occupation. The lack of property titles remains

one of the major barriers for development in Roraima and, indeed, in the Brazilian Amazon as a whole.

Table 10: GINI coefficient of land concentration in Roraima (1960-85)

1960	1970	1975	1980	1985
0.669	0.618	0.887	0.788	0.754

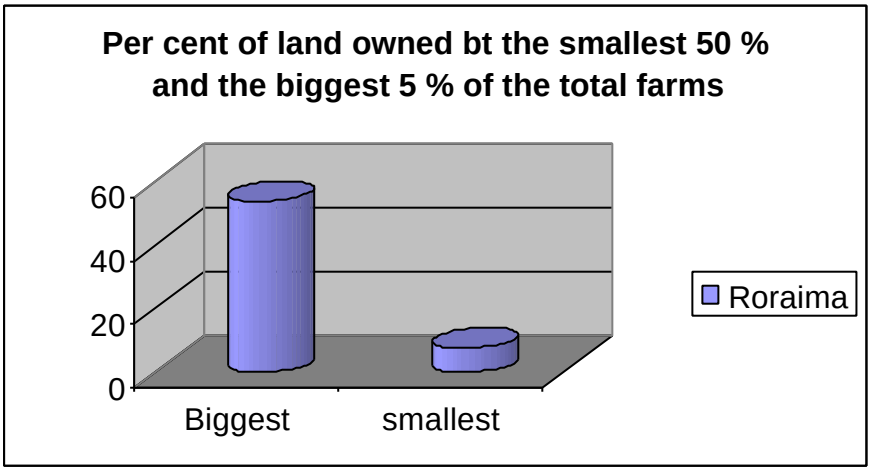
Source: R. Hoffman (1982 & 1987)

Table 11: Roraima's indigent people versus the classic Amazon (1990)

	RORAIMA	CLASSIC AMAZON
INDIGENT PEOPLE	3.26%	12.50%

Sources. IBGE 1990, and Choji 1994.
Note: The item indigent people includes only urban population.

Graph 7: Percentage of land area owned by the smallest 50 percent and the largest 5 percent the total farms in Roraima (1985)



Source: Censo agropecuário 1985 and P. Choji (1994)

It is also important to point out briefly that when it comes to the allocation of resources by SUDAM and FINAM, Roraima received a very small proportion. In that sense, the allocation strategy, which was used as a frontier mechanism, did not take place in a significant way in Roraima as it did in other Amazonian states. An analysis done by IBASE (1990) shows that from the 1050 projects approved by SUDAM for the Legal Amazon until December 1986, Roraima only accounted for 18 of them. The relative insignificance of these projects and their impact on Roraima, as well as the allocation of resources to the region, can also be seen along with the fact that the cattle industry did not experience any particular growth at the end of the fiscal incentives. On the contrary, from 1980 to 1985 Roraima experienced negative cattle growth (-0.7). In fact, the heads of cattle went down from 313.881 in 1980 to 303.301 in 1885 (Schneider, 1995: p.2). This is important considering that the 1050 projects financed by SUDAM 641 were allocated to agropastoral projects.[107]

6.4.2 Population growth: Why does Roraima attracted more "job seekers" than peasant pioneers?

Another substantive element of the social structure in Roraima is population growth, and how this pattern has influenced the social composition of Roraima's population, as well as the way in which different social groups relate to each other. For instance, I mentioned the fact that the traditional power of the *fazendeiros* has been challenged basically by the arrival of many *garimpeiros* as well as the influx of many new settlers. Another example is the social stress created by the thousands of *garimpeiros* working on Indian lands.

Let us start by giving a short overview of population growth. Roraima's population grew ninefold between 1940 and 1985, from 12,200 to 104,000. By 1980 the density was 0.35 per square kilometre, the lowest density of any state or territory, compared to 14.07 for Brazil. In the latest demographic census (1996) Roraima had a total population of 247.131, which means a density of 1.07 (see table 12). Despite this sparseness, Roraima's population has grown proportionally faster than the rest of the entire country. The rapid growth has come not only from a high birth rate, but also from the mining boom experienced in the 1980s. Moreover, the opening of the BR-174 road increased the immigration in the 1980s. It is important to note how this population growth did not have a significant impact in terms of increasing in the rate of deforestation. In that sense it can be assumed that although population growth is part of the problem of environmental change, it is not one of the main causes in Roraima.

When it comes to population, ethnic composition before the 1980s could be classified basically in three categories: Indigenous population, *brancos* as the Brazilians call the portion of the population that are a mixture of Portuguese, other European nations, Africans, and Amerindian. So, *branco* has nothing to do with skin colour, it is a cultural description. Finally, *Caboclos*, basically detribalised Amerindians, make up the third part of the Roraima population. They have lived primarily along the region's riverbanks, gathering forest products and hunting game, alongside some subsistence agriculture.[108] The above social composition changed in the 1980s when mining activities and colonist agriculture experienced development.

Although population growth in the Amazon accelerated sharply after the 1960s, Roraima did not experience a dramatic change in terms of demographic density during the 1960s and first part of the 1970s (see table 12). In fact, during these years Roraima remained as a remote and isolated place. However, from the 1970s an important increase can be noted. Thus, in the decade 1960-70 the rate of population growth was 3.26 %, but in the decade 1970-80 it rose dramatically to 7.04 %, and even more in the period 1980-90 when it reached 9 % (IBGE Censos Demográficos 1960, 1970, 1980, 1991). It is clear that this population explosion since the 1980s is not related to an enormous growth in birth rate, but to the enormous amount of people coming to the state as a result of the boom of some economic activities, notably gold mining.

---

[107] Even though in this study Schneider demonstrated that there is not a clear link between the allocation of resources by SUDAM for cattle ranching and the rapid growth of cattle in some Amazonian states.

[108] Most of the Caboclos in Roraima belong to the Caribe speaking Macuxi or Arawak-speaking Wapishana, and live basically in village or malocas.

Table 12: Evolution of demographic density in Roraima (1960-80)

Roraima	1960	1970	1980	1996
Density (Km2)	0.13	0.18	0.35	1.07

Source: Censos Demográficos das Unidades da Ragião Norte (1960, 1970, 1980)

The importance of population growth in Roraima in relation to the social structure is twofold: First, there is a clear connection between population growth and the dynamic of social conflict in the state. This point will be taken in the next section where I will analyse the main focus, dynamics and typology of social conflicts in Roraima. The second aspect has to do with the fact that the majority of migrants, at least in Boa Vista, come from other cities. Many have migrated repeatedly from city to city, often within the Amazon region itself. The above situation leads one to think that the classical image of the Amazonian migrant as a peasant pioneer has to be reconsidered in Roraima. This is important because, once again Roraima presents a notion of change when it comes to migration.

The tendency in the social literature on Brazil is to associate urbanisation with rural-urban migration. However, for Boa Vista at least the rural-urban migration paradigm does not explain the city's demographic boom. As Neaera (1992) argues, migration to Roraima is not an expression of proletarization, but of a shift in an already existing urban labour market, in which a highly mobile urban population flows to wherever employment opportunities can be found. In the case of Roraima, mining was the motor of this dynamic. As a result it can be argued that most of the population coming to Roraima during the 1980s were mostly *job seekers*, rather than *peasant pioneers,* in search of land for living and working.

To summarise, it has been the employment opportunities in Roraima, rather than colonisation projects that have been the cause of migration into the territory. Thus, the population growth variable in Roraima has to be understood in terms of a combination of factors of expulsion and factors of attraction linked to the work market that operate in a bigger context, namely the entire basin.[109]

6.5 Focus of social conflicts in Roraima

Since the main socio-economic, political and environmental variables shaping Roraima's development have been explained, it is my aim now to analyse in some detail the focus, dynamics, and typology of social conflicts found in Roraima. The above will allow me to establish possible links between the variables treated in the above sections and social conflicts. The examination of these potential links is a core aspect related to the main research questions of this study. The main areas of social conflicts in Roraima are all found in indigenous lands. In mapping Roraima one will be able to determine three main areas of social conflicts, which are: the Indian reserve Raposa/Serra do Sol area, the Waimiri-Atraori area, and the Yanomani land. The following section will describe the situation in all these areas.

6.5.1 Indian Reserve Raposa/Serra do sol

6.6.1.1 Physical spatial demands as a source of conflicts

The area Raposa/Serra do Sol is located in the north-west of the state of Roraima, close to the Venezuelan border. According to *the Conselho Indígina de Roraima* (1992) most of the

[109] This is a category used by Paul Singer in his work "*Economía Política da Urbaniza*ção", 1973.

conflicts in this area started in 1970s, with the creation of INCRA Roraima in 1973. From this date the *fazendeiros* began to demarcate their lands, and as a result many Indians began to be accused by the *fazendeiros* of invasion of property. A report elaborated by the Conselho Indígena de Roraima stated that by 1992 there were 78 *malocas* and the Indian population including Macuxi, Ingariko, Wapixana were around 9,688. The same report stated that there were 180 places in the area with no Indian population, 48 in the region da Serra, 68 in da Raposa, 19 in do Surumu, and 44 in do Baixo Cotingo. Most of these places were farms.

The number of open conflicts in the area has been partially recorded by the *Conselho Indígena de Roraima* (CIR). The data shows that from 1988 to 1992 there have been 10 Indians killed in this area either by ranchers, *posseiros*, or *garimpeiros* (CIR, 1992). However, the most important form of violence practised against Indians is the invasion of their lands by *posseiros,* and the burning of their *malocas* by *posseiros* and ranchers. To have an idea of the frequency of conflicts in this area, according to CIR around 19 conflicts between Indians, *posseiros*, *garimpeiros*, and *fazendeiros* were registered from January to October 1997.

Fieldwork done in the Macuxi area shows that most of the *fazendeiros* came to this area asking for land for cattle pasture, arguing that they did not have any interest in owning the land. Thus, once they did it, they decided to stay, a situation, which became a source of conflict, due to the dispute for the physical space between ranchers, *posseiros* and the Indian population. It is important to note also that many *posseiros* work in the *garimpo* activities developed in the Raposa/Serra do Sol area, basically in the area of Quino, Cotingo, and Mau rivers. According to the data published by CIR (1992), there are 140 people with *localidades pecuarias* in the area Raposa/Serra do Sol. From that number 70 are involved in other activities, most of them in the *garimpo* economy.

An important factor that has contributed to promoting the dynamics of conflict in this area is the system of *sorte,* which was a means of invading Indian lands. In a way one could say that one of the core elements of the Roraimaense ranching economy has been the *sistema de sorte.* The *sorte* has been the ideal way for the *fazendeiros* to control a given area and at the same time this system has promoted the enlargement of the cattle ranching area. Once the *vaqueiro'*s herd has grown to a suitable size he will need a *vaqueiro* to take care of his new herd. In that sense the *vaqueiro* becomes a sort of new *fazendeiro,* requiring new land.

The mining activity in this area is the other factor introducing stress on the social network. It should be said that most of the *garimpeiros* in this area arrived following the closure of the gold camps in the Yanomani reserve, which has provoked a situation in which the problem has been just transferred from one Indian group to another, in this case from the Yanomani to the Makuxi population. So not surprisingly, tensions between *garimpeiros* and Indians rose, most notably in villages closest to the principal mining areas. At least four Macuxi were killed in fights with *garimpeiros* between 1990-91 (CIR, 1992). The uncertain nature of the Macuxi's legal rights to the land and the unwillingness of the federal police to intervene heightened the conflicts. Much of the problem can be related to the fact that the Raposa/Serra do Sol reserve was not officially demarcated for many years, and therefore the *garimpeiros* did not regard their presence as illegal. In addition, many local politicians were defining the invasion to ensure the continuous growth of the state's mining economy. This area was finally demarcated in December 1998 through a decree signed by the Brazilian Justice Minister Renan Calheiros.

It is important to note that the point here is not that the Macuxi do not participate in gold extraction, but on the contrary, these Indians have a long tradition in this activity.[110] Beside

[110] It is clear that many of the Indian Groups in the Amazon appreciate the benefits of mineral extraction when it is practised on their own terms. Such example could be found in the Kayapó, Yanomani, Mundurukú, Amarakaeri, and lately the Waimiri-Atroari.

their traditional activities of fishing, hunting and agriculture, other occupations such as mining, urban employment, and working as cowhands provide the Macuxi with all their cash income. In short, mining represents a small cash income to complement their predominately agricultural subsistence. Their fights against *garimpeiros* have to be understood in this context. For instance, in May 1992 the Macuxi established roadblocks on the access routes to the *garimpos* along the Rio Maú. Their objective was to gain control over the activity rather than to close down the mining on their lands.

Due to mining activities the direct relation of the Macuxi with ranchers and *donos de garimpo* has provoked a division among the Macuxi. According to MacMillan (1995), the majority of villages (particularly those nearest the mining areas) still defend CIR's proposal to expel all the ranchers and *garimpeiros* from the reserve. But a number of settlements (particularly those receiving government investments) argue against this, claiming that a contraction in the savannah economy will be detrimental. These internal conflicts are exploited by the ranchers and *garimpeiros* threatened with eviction.

6.5.1.2 The controversial decree 1775 and its impact on Raposa/Serra do Sol

As can be seen from the above exposition this area has been under stress for a number of years. However, things apparently got worse with the issuing of decree 1775 in 1996. The convulsion generated by this decree has to be understood in the context of the new Brazilian constitution of October 5, 1988. The new constitution put special emphasis on human rights and instituted very positive policies such as guarantees for indigenous people's rights. Article 231 recognises both the cultural and territorial rights of indigenous people based on their traditional heritage. It acknowledged and established their rights to live permanently on their traditional territories, including the exclusive use of the natural resources necessary for securing their cultural integrity and welfare. The formal protection against their territories was also inscribed in the new constitution.

Despite the above legislation, decree 1775 was ratified with President Fernando H. Cardoso's signature in January 1996. Written and proposed by Minister of Justice Nelson Jobim, the decree introduced the so-called principle of contradiction within the administrative procedure for demarcating indigenous lands. It provides a legal mechanism for those who also claimed access to indigenous lands to appeal against demarcation. Thus, according to FUNAI after the decree there were 531 contestations against 83 indigenous areas. Nelson Jobim dismissed most of these, except for 8 areas of which he ordered further evaluation by FUNAI, including the case of Raposa/Serra do Sol.

For many observers decree 1775 is unconstitutional, because it contradicts what was established in the new constitution, especially in the already cited article 231. After the passing of Decree 1775, Raposa/Serra do Sol became one instance of the most heavily contested Indian land. Thus, the decision to reduce this area to 200,000 hectares was made on December 24, 1996. The reduction stimulates the claims by some 14 ranchers to whom the National Institute for Colonisation and Agrarian Reform (INCRA) has been issuing titles since 1982. In addition, this situation also promoted the creation of some areas of *garimpo* due to the fact that many of the *garimpeiros* working in the Yanomani area moved to Raposa/Serra do Sol because this area, unlike Yanomani land, was not officially demarcated. According to data held by CIMI (1996), after the passing of decree 1775 the most affected indigenous land has been São Marcos inhabited by Makuxi and Waxipanga in the area Raposa/Serra do Sol. Following CIMI data 573 requests based on decree 1775 have been made on this area by many different entities and citizens (CIMI, 1996: p.49).

In conclusion, Raposa/Serra do Sol is a contested area. The new demarcation of 1.6 million hectares perhaps could contribute to diminishing social conflicts in the area. What is clear is that the emergence of conflicts in this area has been mainly the result of the dispute over physical space between Indians, *garimpeiros*, *posseiros*, and ranchers. So, we have one physical space, utilised in various ways and serving different social groups and their production activities. This situation has had important consequences on the individual security of the Makuxi, Wapishana, Ingariko, and Taurepang. For example, several Indians have been killed as a result of conflicts with ranchers, *posseiros*, and *garimpeiros*. In addition, the utilisation of this physical space by several users in an unregulated way has had other implications. For instance fish have become scarce, and due to the large open pits of stagnant water left by miners malaria has spread, becoming the main cause of death among the Macuxi.

6.5.2 Waimiri-Atroari area: Mining, dams, and road construction

6.5.2.1 Paranapanema versus Waimiri- Atroari

The second area that has experienced latent and, to a certain extent, open conflicts is the Waimiri-Atroari land in the south of the state of Roraima and north of the state of Amazonas. In the past, the Waimiri were a separate group from the Atraori, but now they form one group living in the basin of the Alalau river. The exact population is unknown because they keep moving back and forth over the borderline between the states of Roraima and Amazonas. The Waimiri-Atroari occupied an area of 2,585,911 hectares, but its current size is 1,146,100 hectares within the municipalities of Novo Airão, Moura, Presidente Figueiredo, and São Luiz. As in the previous case, mining exploitation has been the main cause of social unrest in the area. To a lesser extent other factors such as the construction of the Balbina dam and the construction of the BR-154 have also stimulated conflicts.

At the end of the 1970s the mineral company Paranapanema invaded the territory of the Waimiri-Atroari. In this case we will see how the encroachment of this Indian territory was the clear result of a conflict of interests between this corporate activity and the Indians. The way in which this company got access to the land has been very well reported by Stephen Baines at the University of Brasilia in an article entitled “The Waimiri-Atroari and the Parapanema Company” (1991).

Following Baines’ study, Paranapanema carried out an initial survey of this area in 1973. During the period 1976-78 the existence of significant deposits of cassiterite in the basin of the Uatuma River was revealed. In 1979 concessions for mining cassiterite in the region of the Uatuma River were officially granted. On October 3, 1979, the president of FUNAI informed the director general of The National Department of Mineral Production, that the concessions granted covered 80 % of the zone which lay within the indigenous reserve granted to the Waimiri-Atroari. As a result of this, in 1980 Paranapanema declared that the prospecting work which began in April 1979 was already well advanced. Under these circumstances FUNAI decided to send two agents to the area. In the report produced after FUNAI intervention it was stated that: “There has not been reported any presence of Indians in the north-east part of the Waimiri-Atroari reserve” (Cited by Baines, 1991: p.145). In this way the report by FUNAI was used to justify the cutting up of the eastern part of the indigenous reserve, the zone in which Paranapanema had already established its prospecting activities.

In the 1970s the systematic surveying of Amazon’s natural resources through *RADAMBRAZIL* had produced a map of the Amazon of a scale of 1.250,000 financed by PIN (the Plan of National Integration) and DNPM (National Department of Mineral Production).. According to Baines (1991), “the cartographers for this project and the aerial photography company Aerofoto Cruzeiro had during the process, altered the maps of the disputed region in

line with the interests of Paranapanema. They had changed the name and the route of the upper course of the Uatuma river in order to substantiate the arguments for cutting into the Wimari-Atroari reserve […] it was an attempt to demonstrate that the north-east boundary was not where the maps of FUNAI indicated it was. Up until 1971 in all the Amazonian maps, the *igarape* Santo Antonio do Abonari joined up with the Uatama river above the co-ordinates 59-45 W and 1-30 S. On the maps of *RADAMBRASIL* this affluent of the Uatuma river is situated at a place 75 km further to the west, upstream from its initial position. These cartographic manipulations had the effect of situating the Uatuma river to the west of its real position and as a consequence permitted the dismemberment of 40 % (526,800 hectares) of the Waimiri-Atroari reserve, freeing the mining claims for Paranapanema" (Baines, 1991: p.146).

Another important aspect to point out is that in order to justify its claims over the territory, Paranapanema always invoked the importance of the project for the Brazilian economy, by virtue of its capacity to generate foreign exchange. Thus, according to a Paranapanema report entitled *Projecto Pitinga*, this cassiterite reserve was one of the most important and capable in the short-term of producing a considerable amount of foreign exchange for the country. The same report adds: "The internal market is totally satisfied by current levels of production, therefore all the *Pitinga* output will be destined for export" (Quoted by Baines, 1991: p.148).

It has been reported that as a result of mining operations in this area, the waters of the Alalau River were heavily polluted, having turned yellow and become unsuitable for fishing. Many of the Indian populations were forced to move. The Alalau River is important for the Waimiri-Atroari considering that nine house villages are located in its basin (Migliazza, 1978: p.11).

Other aspects that contributed to creating social stress in the area was the authorisation (presidential decree No.92426), on the 25th of February 1986, to built a private hydroelectric plant equipped with four turbines with a nominal power of 3100KW, on land taken from the Waimari-Atroari. Moreover, the construction of a road by Paranapanema has been a controversial factor too. This thirty-eight kilometer private road was to cross what remained of the reserve. In 1982 the authorisation to open this private road between the 250 km mark of BR-174 and the Pitinga mine was granted by colonel Paulo Leal, then president of FUNAI. The permission was renewed in 1985 by the new FUNAI president Romero Jucá Filho. FUNAI functionaries often justified the decision on the grounds that it was an economic enterprise in the national interest. The influence of Paranapanema on FUNAI structure was very evident during those years.[111] Moreover, the company used to give some kind of royalties to the Indians as a way to continue operating in the area, for instance the building of houses. Access to the road was controlled by a private police force employed by Paranapanema.

One of the most notable conflictive episodes happened in 1996, when the Waimiri-Atroari took the indigenous post located at the entrance of the road leading to the mineral project. After almost one month of occupation the Indians decided to give it back in return for a payment of 50,000 reais (close to $50,000) monthly during the first year for the circulation of cars and trucks on the road transporting the mineral (*Porantin* Newspaper: December 1996, p.7). Thus, on December 11, 1996, after the signature of the agreement between Paranapanema and the Waimiri-Atroari, the road was reopened again.

[111] The problems caused by Paranapanema were recognised officially by the government when IBAMA in 1990 decided to impose a $1,000,000 sanction for illegal deforestation of 4,000 hectares. However, such a penalty was condoned by the company under the agreement of meeting environmental regulations.

6.5.2.2 Balbina: The social and environmental costs

The other project with clear implications for the dynamics of social conflict is the Balbina Dam, located on the Uatuma River. The reservoir floods an area of approximately 2,346 km2 which majority which comprise untouched forest until 1970 (Cummings, 1990: p.44).

Around 311 km2 of the territory flooded was inside the already reduced reserve of the Waimiri-Atroari. The flooding transformed all the headwaters of the *igarapé* Santo Antonio do Abonari, *igarapé* Taquari, and Uatumâ river into an uninhabitable area with putrefaction of the submerged tropical forest, turning the water unfit for any human use. Thus, according to Gribel (1989), the construction of the dam created a lake of mud and stagnant water, its surface area covered with macrophytes, forming an environment which encourages the proliferation of tropical diseases.

In relation to the existence of conflicts, one should say that even though no open conflicts resulted from the construction of this dam, latent conflict was experienced in the way of social stress between local population and government officers. For instance, in this context on March 26, 1989, a public demonstration against Balbina took place in the small town of São Sebastião do Uatuma about 300 km downstream from the dam. This event was symbolic with hundreds of riverside dwellers present.

The main repercussions of the project were the relocation of a third of the Waimari-Atroari Indian population, which created a dependence of the Indian population on the urban economy.[112] Secondly, this relocation put more pressure on their land and exposed them to disease. Finally, the effect on food security is clear, because water in the Uatuma River is not suitable for domestic consumption, and the fish are dying due to the contamination of the aquatic environment.

6.5.2.3 The BR-174 and the reduction of the Waimiri-Atroari population

The BR-174 is the third element of the web leading to social stress in the Waimari-Atroari area. The BR-174 connecting Manaus to Boa Vista was constructed, as I have pointed out, mainly to facilitate military access to the northern region of the Amazon, as well as to gain access to mineral exploitation in the northern Amazon, and to lesser extent because of the need to link Boa Vista to Manaus.

The problem started with the construction of this highway. Fights broke out between the Waimari-Atroari and construction crew, as well as between the Indians and FUNAI officers. On December 27, 1974, the regional director of FUNAI, Gilbert Pinto was killed in an Indian attack on the Abonari Indian Post (Davis, 1977). Throughout 1974, attempts by FUNAI to encourage the Indian to accept the road failed, but the government persisted with the plans. It is likely that the construction of the BR-174 had some impact in the reduction of the number of Waimiri-Atroari. It is known that this group has a high mobility, but nevertheless the drop in the population coincided with the construction of the highway (see table 13). Perhaps the most important impact of the road was the spread of diseases among the Indian population. Before Pinto's death, he reported that by 1974 the population of the Waimiri-Atroari had dropped to 600 or 1000, a reduction of at least 66 % in only two years (1972-74). This clearly meant that the BR-174 directly or indirectly had negative consequences on the Waimari-Atroari population.

[112] This situation happened above all because the relocated communities were settled along the BR-174, making the Waimiri-Atroari depend on the government provisions for their food, clothes and health.

Table 13: Decline in the Waimiri-Atroari population

Year	Population	Year	Population
1905 (estimation)	6,000	1974	600/1000
1968	3,000	1982	571
1972	3,000	1983	350

Source: Jordan 1987, P 15
Note: Most of the numbers for recent years are taken from FUNAI estimates.

Summarising, the Waimiri-Atroari area has been a contested area where both latent and open conflicts have emerged due to the conflicting interests among distinct groups. The conflicts in this area have also been reinforced by the institutional framework that has shaped the structure of conflicts. A clear example already mentioned is the delimitation of the Waimiri-Atroari territory after RADAMBRAZIL, and the alliance between FUNAI and Paranapanema. However, according to *Documenta*ção *Indiginista e Ambiental* (DIA) the situation is now quite different. An increase in the Waimiri-Atroari population has been recently reported, so 706 people have been registered in 1996. In addition, the social condition of the group is good. The Indians today have a series of facilities available such as schools, and in their territory there are no reported invasions.

6.5.3 The Yanomani area

6.5.3.1 The richness of Maciso das Guianas as a source of conflict.

The Yanomani are primitive hunter-gatherers in the state of Roraima, occupying the border area between Brazil and Venezuela. The current population is estimated between 7,000 and 9,000 Indians. They occupy an area of forest that, although inadequate for intensive agriculture, the rivers and hills were found to be rich in gold and tin. The region is known as *Maciso das Guianas* and is one of the oldest geological formations of South America.

The conflictive situation in the Yanomani area started with the discovery of mineral wealth, which encouraged *garimpeiros* to invade the area. The *RADAMBRASIL* project discovered an important granite formation around the Serra de Surucucús, at the same time *RADAMBRAZIL* showed that an important amount of gold and diamonds could be found in the river sediment that drained the Roraima conglomerates. The problem was that both formations lay in the heart of Yanomani land.

It should be said that mining companies have normally shown no great interest in this area, maybe because a more detailed geological survey in this remote area is sufficiently expensive and risky to dissuade investment. The risks are above all due to the legal complexities which imply that claims from mining concessions on indigenous reserves must be registered by the *Departamento Nacional de Pesquisa Mineral* (DNPM). Furthermore, companies can only work in this area with both the permission of FUNAI and the consent of the relevant Indian group (MacMillan, 1995: p.269).[113] Due to the above situation, most companies prefer to work in Pará and Rondônia, where access is easier and some of the areas lay outside Indian reserves. That is why mineral resources in Roraima have been basically exploited by *garimpeiros*.

[113] Even though the private-sector investment in Roraima has been minimal, 197 claims to the state's sub-soil are registered with the DNPM, covering a total 1,927,831 hectares (cited by Gama de Silva, 1991: p.282).

Garimpo activities started in this region from 1975 with the establishment of the *garimpo* on the Serra de Surucucús. In 1985 there were approximately 600 *garimpeiros* working in the Yanomani area. However, after 1987 Yanomani land was invaded by approximately 40,000 *garimpeiros* who took of all its main rivers at the headwaters (Albert, 1992: p.43). The main reason for this was the discovery of sizeable gold deposits at the *garimpo* of Cambalacho at the headwaters of the Apiaú river. Following the invasion of Cambalacho, the intensity of mining at the watershed of the Apiaú River increased as smallholders walked the two-week long trail from the Apiaú colonisation project to seek out new deposits.

6.5.3.2 Warfare between the Yanomani and Garimpeiros

By July 1987, the emerging wave of conflicts had its first manifestation when Manuel Luiz, a farmer from Alto Alegre crossed the watershed and discovered a gold-mining operation belonging to the Yanomani along the middle reaches of the Mucajaí basin. Its owners were absent at the time, and so Manuel claimed the site naming it the *garimpo* of *Novo Cruzado*. Accounts differ over what happened next. It has been suggested that the Yanomani who returned to the site a few days later came into conflict with the intruder. Yet some *garimpeiros* argue that a working relationship was established with the Yanomani owners and violence broke out when this agreement subsequently collapsed. Whatever the case, a clash ensued which left four Yanomani and one *garimpeiro* dead (Folha de Boa Vista, August 12, 1987 and cited by MacMillan, 1995).

The Yanomani had reportedly expelled miners from that area on three previous occasions, and relations between the two parties were increasingly violent. Although this was not the first incident of this kind, it did prompt both FUNAI and the state governor Getúlio Cruz to threaten closure of these clandestine mines. The first plan to remove *garimpeiros* (known as operation Roraima) was launched in September 1987, but its inefficacy could be understood as a lack of political will to tackle the problem with conviction. It should be remembered that some governors of Roraima have been fierce defenders of the *garimpo* activities, for instance Romero Juca.

The number of casualties among the Yanomani due to conflicts with *garimpeiros* has been accounted for by the *Conselho Indígena de Roraima* (CIDR). Thirty-four murders were recorded between 1987 and 1996, however these numbers are certainly conservative, due to the fact that many of the violent incidents between these two groups took place in remote places which are very difficult to register.[114]

Another factor that has contributed to jeopardising the survival of the Yanomani is the construction of the BR-210, a highway that crosses the area in the south-eastern part. In fact, this road reaches the Ajarani River, crossing it twice. As a result, settlers started to colonise the land. In 1974 the same road reached the Catrimani River, and probably as a result of this by 1976 an epidemic of influenza, measles, malaria, hepatitis, and tuberculosis spread in the area killing many Yanomani.

If one takes into account the fact that the Yanomani population decreased dramatically in the 1980s, then one realises that the number of dead produced by direct violent confrontation represented only a small portion of this decrease. The most important causes have been the effects linked to the gold rush such as river pollution, and transmission of diseases such as

[114] The distribution is as follows: 1987 (4); 1988 (1); 1989 (5); 1990 (4); 1992 (2); 1993 (16); 1994 (1), 1995 (1).

malaria and tuberculosis.[115] According to the newspaper *Folha de São Paulo*, the total number of Yanomani has been reduced drastically from about 40,000 in 1989 to approximately 7,000 in June 1991.[116]

According to the National Health Foundation, mortality growth among the Yanomani continues, rising from 14.6 in 1993 to 18.5 in 1994. The most important of the diseases that are affecting them is malaria, which has been enhanced by the invasion of miners. This has contaminated around 80 % of the population according to this study.

In conclusion, the Yanomani area has clearly been an area of open conflict. The main source has been the dispute over physical space, in particular for the mineral wealth of the subsoil due to the existence of gold. In this area, accommodating the interests of the *garimpeiros* and Yanomani has been extremely difficult, because first the demands involve the satisfaction of basic needs for both social groups, and second due to the existence of a quite different pattern of resource use between *garimpeiros* and Yanomani.

6.6 Understanding dissensual conflicts in Roraima: values and norms facing different social structures

In the previous sections I presented a description of the main focus of open conflicts in Roraima. From the three areas evaluated, it can be noted that a combination of consensual and dissensual conflicts exist. Although in many cases the dispute was about a tangible object, and in other cases such a dispute was, above all, a disagreement on norms and values. In that sense, this section will try to show the main argument around which the construction of dissensual conflicts evolves. Thus, I argue that much of the dissensual dimension in the conflicts found in Roraima are: firstly a product of the unsolved contradiction between the imperatives of economic growth and livelihood of indigenous people, secondly, because of the primacy of the values of security and integration in Roraima and the different meaning that these values have for different social actors, and finally, that the confusing legal framework, as well as the unclear competencies of the institutional framework, influence the occurrence of dissensual conflicts in Roraima.

6.6.1 Livelihood of indigenous people versus economic growth: Which imperative comes first?

The first dissensual conflict is formulated in terms of development values. For many the question has been: *What is most important for Roraima's future?* The answer to this question has been a dilemma in Roraima, because it has implied a clash between Indian livelihoods and economic growth. This is by virtue of that fact that Roraima has a significant size of Indian population. However, as I showed, most of the subsoil wealth in Roraima lies within Indian territory. This problem is aggravated if one takes into account the fact that Roraima's natural resource base is very poor. For instance, Roraima seems to have the worst potential for agriculture in the Amazon, because the region's soil possesses extremely low levels of fertility, even by Amazonian standards. Only 0.1 % (19,200 ha) of the territory's area was considered suitable for agriculture without intensive application of fertilisers and correctives (Minesterio de Agriculture 1980). In addition, according to Albert and Lourenzo (1996), ranching reached its natural carrying capacity in the 1940's. Though considering that ranching

[115] According to a publication done by CIMI and CNBB, in 1983 the incidence of tuberculosis among the Yanomani was four and half times bigger than the rate expected for the Brazilian population (24/10,000 against 5.2/10,000).

[116] Cited in *Folha de São Paulo*, July 4, 1991, São Paulo, Brazil.

would expand, this growth would do little to improve Roraima's social conditions. As I have pointed out, cattle ranching in the Amazon absorbs few workers even at high rates of productivity.

Circumstances make mineral extraction the most valuable resource for development in Roraima. The state has deposits of diamonds, topaz, cassiterite, titan, copper, zinc, radioactive minerals, and rich gold reserves. An example of these dissensual conflicts is found in a public statement given in 1989 by the governor of Roraima:

> *"We are not going to hinder 20,000 Roraimenses, who need the development of the state for 12,000 Indians, because they will bring us down. We will look for a solution that will not impede the region's progress"*[117]

As a result of the above scenario conflicts have risen in terms of *how is it possible to exploit these resources without destroying these Amerindian cultures?* An absolute argument would say that if the livelihood of the region's indigenous groups is to be respected, some regional resource base, other than the mineral reserves that lie on indigenous territory, must be exploited. However, this does not seem to be the most accepted discourse, at least by the most important political forces at local and regional levels. It is quite clear that in the conflicts on land demarcation and mineral exploitation in Roraima, there have been two rival sets of actors. On one hand there are the Indians, some organisations linked to the Catholic Church such as the Pastoral Land Commission (CPT), the Missionary Indian Council (CIMI), and some NGOs. On the other hand, there is the military apparatus, the local government, the *garimpeiros*, cattle ranchers, and corporate activities. I would argue one could place FUNAI in between, because its position has been ambivalent, sometimes with a progressive discourse (especially lately), and sometimes playing a more conservative role.

A final aspect that has to be evaluated is to what extent the local government of Roraima is interested in keeping miners out of the indigenous areas of Raposa/Serra do Sol and Yanomani. Since these areas are extremely isolated, the investment in controlling the traffic of miners is expensive and difficult. Lately, at least in the case of Yanomani, the government of Roraima was willing to make such an investment due to international pressure, in the capacity of negotiating in favourable terms with international investors and money-lenders. However, recent information pointed out that helicopter surveillance operations of the Yanomani area were suspended in March 1996.

6.6.2 Security and integration: The incompatibility of values for different social structures

As we have seen from the development of this chapter, two ideas have always been present in Roraima. The ideas of *integration* and *security.* In terms of integration it has been quite clear that the way the planner thought to overcome Roraima's underdeveloped situation was to integrate Roraima into the national economy. In that sense, all the infrastructure built during the military and the civilian regime aimed at overcoming Roraima's relative isolation, as well as serving security imperatives. The conflicting situation arrived when this value was faced with two different social structures. On one hand we have the native population, on the other, the urban-rural population. The basic problem is that integration for the latter group means disintegration for the native population. The different projects behind the idea of integration have certainly had recognisable impacts on the traditional way of living for the local population. Examples of these projects are the BR-174, *Parimental Norte*, PIN I, II, III,

[117] Cited by Elizabeth Allen *in "Calha Norte: Military Development in Brazilian Amazonia"*, 1989.

and *Calha Norte.* In short, the conflicts are summarised by the fact that the Brazilian State's strategy for incorporating new spaces to the economic frontier has very much been in opposition to the traditional way of living of indigenous communities.

The second conflicting value in Roraima is security. As I showed in the historical section of this chapter, Roraima has been an area of territorial dispute since the configuration of the Brazilian State. Thus, the issue of incorporating this area into Brazil has been constant, and the military apparatus has used the ideas of security and protection to justify occupation and management of the area. It should be remembered that Roraima has a long extension of international border. In this sense it is not strange that the first cattle ranching was viewed by the state as a security measure. With the military coup in 1964 the security idea was reinforced, and the need to occupy the region once again became a geopolitical priority. The construction of the BR-174 and BR-210 highways should be understood in this context. The new civilian government of 1985 did not stop this tendency. On the contrary under the Sarney government a new security plan known as *Calha Norte* was launched, and later on *Nossa Natureza* aimed to show to the international community that the management of the Amazon was a Brazilian responsibility. This tendency still continues today with the *Sistema de Vigilância e Controle da Amazonia* (SIVAM) program, launched by the current government of Fernando H. Cardoso under partial management by the military.[118]

The point is that such a security conception has a different meaning for the native population. For instance in the case of the Yanomani, this group lives on the Brazilian-Venezuelan border, so its security is more related to the preservation of the ecosystem as a provider of food and shelter than to the geopolitical considerations. In addition, the "securitisation" of the Indian policy intended to use the Indians as a living frontier with clear implications on the way Indian policy is designed.

6.6.3 The implication of the legal system and the institutional framework on the formation of dissensual conflicts

In the recent years it has become clear that the overlapping of the legal system and some government institutions has been a source of dissensual conflicts. I would like to give two examples of how this overlapping is formed. First of all, although the constitution article 231 defines indigenous land and reaffirms the collective rights of Indians to the land they have traditionally occupied, including the rights to secure their cultural identity, the Indian Statute (law 6.001 December 1973) as well as the presidential decree 1775 (1996) present a different picture. For instance, in the Indian Statute it is possible to find clauses such as the provisions that Indian groups can be removed from their own lands for reasons of national security or for the construction of public work (case of Balbina dam in the Waimiri-Atroari). Along the same lines, the presidential decree 1775 changed the procedure for demarcating indigenous land by introducing the possibility that states, municipalities and other interested parties opposed to it may express themselves in order to demand compensation or show error in the delimitation of indigenous land.

To illustrate the conflict generated by this contradictory legal web one can use the Yanomani case. In 1988 Yanomani land was divided in 19 separate areas and entrusted into the national forest as well as the national park. This measure essentially consists of a juridical and administrative measure to integrate indigenous lands to the economic frontier via a transition phase as conservation units. The Yanomani areas were divided into two different and conflicting areas: (i) Areas governed by the forestry code and (ii) Indigenous areas. It

[118] SIVAM is a project designed to control the air traffic in the Amazon as well as to monitor mining, deforestation, and illegal activities.

should be noted that the regulation and use of the conservation units as administered by the Brazilian Institute for Forestry Development (IDBF) are contradictory with article 231, that explicitly gave the right to Indians of permanent possession on lands traditionally occupied by them.

The point is that national forests can be used for economic purposes, such as commercialisation of timber, which is incompatible with indigenous forms of occupation and use of natural resources. As is indicated by Albert (1992), national parks are areas of both integral or quasi-integral preservation, and can also impose restrictions on the exploitation of certain flora and/or fauna resources essential to productive activities of indigenous people. Directive 160 was the first administrative procedure that came into conflict because it clashed with the constitution. Directive 160 ensured that the exclusive land rights of the Yanomani would be confined to the 19 territories, thus taking away around 70 % of their traditional territory.

A new directive was later issued (250) in order to reformulate directive 160. Directive 250 determines that economic activities by non-Indians within the national forest are subjected to the exclusive approval of FUNAI and IBAMA. It is worth mentioning here that in July 1988, IBAMA (then IBDF) made a proposal to regulate the use of national forests, in which mining was allowed within their boundaries, and that a law was passed in July 1989 (Law 7.805, article 17) authorising IBAMA to grant mining concessions for mineral prospecting in the conservation areas under its jurisdiction (Albert, 1992: p.44). Through these measures, 50 % of the Yanomani lands that have been transformed into national forest by directive 250 can be opened ex officio to mining companies directly by IBAMA with FUNAI's consent.

In this way directive 250 conflicted with another indication of the new Brazilian constitution which states that all decisions regarding the exploitation of mineral resources in Indian lands must be approved by the national congress and by the Indians themselves (see constitution article 176 paragraph 1 and article 231 paragraph 3). However, on April 19, 1991 (National Indian day), president Collor de Mello revoked the delimitation of the Yanomani lands put into effect by the government of José Sarney.

The second dimension of this subject has to do with the overlapping of duties of the institutional framework influencing the formation of dissensual conflicts. I will use the army as an institution to illustrate this. It is clear that the military apparatus has always been involved in the establishment and conception of environmental and indigenous policies in the Amazon and Roraima as well. A brief historical synopsis shows that the National Security Council (CSN) in 1985 took upon itself, and officially in 1987, the process of demarcation of Indian lands. In 1988 for instance the CSN took charge of the Project for the Protection of the Environment and the Indigenous Communities (PMACI). According to Allegretti (1988), the Brazilian government created PMACI in order to meet the requirement for the protection of the environment and Indian land which was a condition for a loan of 148.7 million dollars, for the paving of the BR-364 highway from Porto Velho to Rio Branco.

In the same way, under the scope of the *Calha Norte* project in 1985, the SG/CSN began to take control officially over the direction of the process for defining indigenous lands. According to Albert (1992), this was done on the pretext that the indigenous questions enter significantly into the definition of matters directly relevant to its jurisdiction such as national integration and sovereignty, the integrity of the patrimony of the nation, and social peace. With the transformation of SCN into the National Defence Advisory Secretariat of the Presidency of the Republic (SADEM), a new program was launched in 1988, " Defence of the Complex of Ecosystem of the legal Amazon" known in Portuguese as *Nossa Natureza* (Our Nature).

Finally, there are two recent examples showing the prominent role of the military in designing Amazonian policy. First, the Ecological-Economic Zoning is under the direction of

the Secretariat for Strategic affairs (SAE), which although headed by a civilian, is the direct successor of SADEN and the National Intelligence Service. Second, SIVAM is a new program of Amazonian surveillance launched in the current administration, which is under military control (see chapter V for more details on this program).

In summary, the institutional framework has influenced the formation of dissensual conflicts, as I have shown in the case of the military apparatus, which has taken over duties that should fall under the jurisdiction of other government agencies. This has certainly been evident in environmental policy, mining policy, and Indian policy. The above has the clear implication of putting the environment and indigenous issues under the military rubric, therefore, being related to the national security and national integration imperatives, but unrelated to the livelihood and social needs of the native population including Indians, *Caboclos*, river dwellers, etc.

6.7 Concluding remarks

In the first part of this chapter I stated that the central preoccupation was to clarify what kind of relationship could be established between the process of environmental change and social conflicts in Roraima (research problem). At the same time, I mentioned that a core aspect was to bring a systemic perspective to relate Roraima to the larger system, which is the Amazon basin.

As an overall final remark it can be said that most social conflicts in Roraima are related to mining exploitation, mainly in Indian lands. In this sense the best known open social conflicts in Roraima have to do with gold-mining on the Yanomani lands, gold and cassiterite in the Waimiri-Atroari area, and gold and ranching in the area of Raposa/Serra do Sol. So, *Does this represent a different phenomenon compared with the rest of the Amazon?* In principle it does not, because it is obvious that one finds many social conflicts caused by mining exploitation in other Amazonian states. The particular fact with Roraima is that almost all the social conflicts take place on Indian lands and are related to mining. In that sense other conflict-issues typical of the Amazon such as land conflicts and logging disputes have been almost non-existent in Roraima.

From the above concluding remark, as well as from what has been presented in this chapter, I would like to make some concrete observations:

First, Roraima shows that a hypothesis such as, 'the greater the resources available to the system, the less likely are conflicts among its components', has to be studied carefully. In Roraima most of the conflicts are not generated by a strong pattern of environmental scarcity, but by the opposite, the wealth of the subsoil. In fact, mineral resources are the main cause of conflicts in Roraima. The areas of Waimiri-Atroari, Yanomani, and Reposa/Serra do Sol confirm that statement. The above situation does not imply that I deny the potential role played by ecosystem limitation in Roraima, however it is not the ecological scarcity variable that is the most relevant one explaining social conflicts in Roraima.

Second, the formulation of a causal hypothesis such as 'the bigger the environmental disturbance to the system, the more intense the social conflicts', has also to be revised in the case of Roraima. As I have shown, even though the process of environmental change in Roraima is not so acute by Amazonian standards, we have many different areas of social conflicts. This only shows that a single factor rarely explains a social event such as social conflicts. It is normally the combination of factors in time and space which produce social events.

Third, what is the nature of social conflict in Roraima? I would summarise my argument by saying that in Roraima social conflicts emerge due to the spatial demands of some groups (Indians) clashing with the demands of other groups (garimpeiros, ranchers, mining

companies). The above was evident in the three conflicts pointed out in this chapter. Therefore, the accommodation of interests has been particularly difficult because the pattern of resource-use involved vital aspects of livelihood as I have shown in the case of the Indians and the *garimpeiro* population. In the case of Roraima the relationship between those conflicting groups is largely dependent on productive activities (mining, cattle ranching, fishing, hunting, and gathering).

Fourth, the nature of the social conflicts in Roraima falls into a combination of dissensual and consensual conflicts. The conflicts related to disputes over physical space (consensual) have been reinforced by the institutional and legal framework, as well as by the incompatibility of new and pre-existing social structures that have regulated the productive activities in the state. Thus, in Roraima we have one set of values, beliefs and norms used by the native population such as Indians, *caboclos*, *ribeirinhos*, and another completely different one used by the *garimpeiros*, f*azendieros*, and, *posseiros.*

CHAPTER VII: PARA. THE EASTERNMOST AMAZONIAN STATE

Scope and structure of this chapter

In chapter VI, Roraima was used as the first case study dealing with the research problem. In this chapter I attempt to develop a second and similar analysis of the state of Pará. Consequently the aim of this chapter is *to study the potential sources, focus and dynamics of social conflicts in Pará. In terms of the sources, particular emphasis is placed on the possible contribution of environmental change to such a process*. The focus will be on southern Pará for two reasons: first of all, the state of Pará is much too large to be explained in complete detail, and secondly, southern Pará is of particular interest for the purpose of the research problem. As I will show, southern Pará has been and still is one of the most contested areas in the whole Amazon basin.

This chapter is divided into three sections. In the first section the historical background will be given for the area under study. Here I present a summary of the three most important historical features that have influenced the dynamics of conflicts in Pará. The second section shows the performance of the independent variables which contribute to generating social conflicts in Pará. Special attention will be paid to environmental change. The third section explains the structure and dynamics of social conflicts in Pará. This section is divided into three small subsections dealing with the categories of social conflicts that I have established in Pará, they are: land conflicts, mineral conflicts, and conflicts on Indian lands.

7.1 Historical overview of the main factors influencing Pará's current situation

7.1.1 Pará: The state

Pará is the second largest state of the Brazilian Amazon covering one million square kilometres (see map N.3). The state of Pará includes a major stretch of the Amazon, and huge tributaries, such as the rivers Trombetas, Tapajós, and Xingú. The magnitude of this state can be found in the fact that Pará is divided into two time zones. Since the discovery of the Amazon, Pará has played an important role in the expansion, domination, and possession of the area. For instance, in 1616 the Portuguese built the *Forte do Castelo* at the entrance of the Amazon to prevent French, English, Spanish, and Dutch boats from sailing up the Amazon to claim territory.

By 1626 the area encompassed by the present states of Pará and Maranhậo was set up as a separate colony for the rest of Brazil, and even had its own governor who reported directly to the king of Portugal. In 1751 Belém, became the capital of this region called by then Grão Pará and Maranhão. The city of Belém, and capital of Pará, signalled the starting point of the conquest of the vast Amazon. Founded on January 12, 1616 by Francisco Caldeira, after the expulsion of the French from São Luis do Maranhão, the small nucleus became a magnet for settlers in the area, since the main economic activity was the collection of some spices called *drogas do sertâo.*

In early colonial times the Amazon was linked directly to the king of Lisbon (Portugal), not to Brazil's governor. It was not until 1823, a year after Brazil's independence was proclaimed, that the northern colony of Grão Pará declared its allegiance to the new nation,

and the Amazon was for the first time integrated into Brazil (Schmink & Wood, 1992: p.41). The above situation led to rebellions in several regions of the Amazon, the most relevant being the *Cabanagen* revolt in Pará that began as a dispute between rival elites following Brazil's independence. Around one-quarter of the population of Pará died in the revolt. The region's labour force was devastated by the violence. The *Cabanagen* left an economic and political vacuum in the Amazon, soon to be occupied by a new *elite*: the merchants, traders, and exporters who rose to prominence with the rubber boom (Schmink & Wood: 1992 p.42). In order to understand the problem being addressed in this study, the most important historical features to be discussed are land legislation, extractivism, and the *developmentalism* idea.

7.1.2 Land legislation

The influence of land legislation from a historical point of view is linked to the development of the system of *sesmarias* and *aforamento.* These systems together with the *Lei de Terras* of 1850, promoted *latifundio* (large holdings), hence, their importance in explaining the current situation of land distribution in Pará.

The system of *sesmarias* was an attempt to reserve land for the plantations by prohibiting squatting and raising land prices (Hall, 1991; Santos, 1984; Graziano da Silva, 1980). As a result the ascent of the *latifundio* started in one way with the system of *sesmarias* implemented by the crown. As Santos (1984) pointed out, the size of the *sesmarias* during the 1600s is not clearly documented, because they were not explicitly limited huge areas were allocated to them under this system, at least until 1697. In 1697 the size of concessions was limited to an area of one to three leagues. The fact is that such a tract of land, equal to 13,068 hectares, already constitutes a *latifundio*. Such an area could be exploited (something that was demanded by the crown) only by someone with enough capital and slaves. In this sense complaints refer to the inequality by which the state commonly makes grants of the best lands to the powerful, leaving the poor with none.

The decree published on October 5, 1795 was the final attempt to systematise the rules regarding the *sesmarias*. It demanded that the grantees survey their concessions within a two-year period or else forfeit them automatically. Before the deadline the interest group affected by this decree was able to have it suspended. In the state of Grão-Pará, the rule apparently remained in effect yet was never enforced. The practice of not demarcating property lines as well as the existence of non-productive land holdings remained unchallenged (Santos, 1984).

A final aspect related to land legislation which is important in understanding the problem of land concentration in Pará is the *aforamento perpetuo* system. In fact, this system could be considered as the background to land concentration. Thus, the state land legislation was passed in 1920, and in 1954 it permitted the legal acquisition of large areas of land through a system known as *aforamento perpetuo.* This system was used basically to develop the exploitation of Brazil nuts in Pará, which allowed the consolidation of large land holdings.

7.1.3 Extractivism

The second historical element with clear influence on the current situation of Pará is extractivism. Extractivist activities have been developed for centuries in the Brazilian Amazon. In fact, Pará has some of the richest stands of Brazil nuts found through the entire Tocantins river valley near Marabá, extending south and west towards Conceição do Araguaia and São Feliz do Xingú, and as an indicator of the extreme importance of extractivism in Pará some cities such as Marabá located in the Tocantins rives were established. Marabá was created because of the rubber boom, and later it became the centre for Brazil nut gathering.

Pará became important with the production and commercialisation of rubber in the XIX century. Most of the extraction was concentrated in the middle Tocantins River and along the Araguai and Xingú Rivers. In that sense towns as Marabá and Conceição o do Araguaia were

important as centres for the extraction of latex.[119] Belém also played an important role due to the fact that many rubber export houses were located there.

The end of the rubber boom brought a transformation to those towns; Marabá became the centre of the Brazilian nut gathering and Conceição do Araguaia became an important place for cattle ranching. The establishment of Marabá as a centre of Brazil nuts made the system of *aforamento perpétuo* a relevant factor, later having a great influence on the generation of conflicts.

As an example of the importance of Brazil nuts for Pará, is the fact that by the end of the 1920s this had become the state's primary export commodity and the major source of livelihood for people in southern Pará, especially Marabá (Schmink & Wood, 1992: p.143). This activity was, after rubber, the major attraction bringing people into the region. Migrants came from the closest states of Maranhão and Goias to participate as collectors. However, it is clear that not all the towns experienced the same pattern of development, for instance Conceição do Araguaia decreased in importance in terms of economic output and population in the 1930s.[120]

7.1.4 Developmentalism

The last aspect influencing Pará's current condition is the implementation of *developmentalism* in the state. The two most notorious features of this idea have been the policy of allocating resources to the state, and road building. In fact, Pará is the best example of Brazilian development policies put into effect. It was not by chance that Pará got most of the incentives provided by SUDAM. This fact made Pará a great place for investing in cattle ranching as well as in logging and mineral exploitation. For instance, tax incentives provided by SUDAM generated an explosion of sawmills in newly settled areas. The golden years in the exploitation of *mahogany* (*Swietenia macrophylla*) were the 1970s.[121] The sawmills also influenced the pattern of land settlement since the feeder roads that loggers cut into the forest often favoured the entry of small farmers.

The *developmentalism* idea could be understood in terms of frontier theory development policies, which look at the Amazon region as an area capable of absorbing surplus population from other regions of Brazil as well as favouring the expansion of large-scale capitalist ventures. A safe generalisation is to place Pará as the best example of Brazilian public policies concerning the Amazon put into effect. Since the 1960s Pará has experienced a combination of economic growth aiming to integrate the state to the national economy with strong political control. The above responds very much to the imperatives to occupy empty spaces and to promote economic growth in the Amazon, as can be seen with the cases of the

---

[119] It has been said that the town of Marabá, located on the Tocantins river, was established by a rubber merchant, meanwhile Conceição do Araguaia was founded by missionaries aiming to pacify Indians who lived in the Araguaia-Tocantins River basin.

[120] For example, the population fell from 11,000 to 4,715 between 1920 and 1940. At one point in the 1930s the settlement was even denied its municipal status for a brief period.

[121] The fact that contributed the most to the boom of the timber industry in this area was the construction of the PA-150 which connected Marabá to Conceição do Araguaia and Redencão. This transformed the timber industry by providing an overland link to the port in Belém and to domestic markets.

Carajás iron ore project, the Tucuruí dam, *Polamazonia*, and the Trans-Amazon? settlement program.[122]

As I have mentioned, road construction was an important tool for promoting the *developmentalism* idea. In fact road building could be considered the initial driving force in the implementation of the *developmentalism* idea in Pará. The real opening of Pará started with the construction of the Belém-Brasilia highway (1956-1960) implemented by the Superintendency for the Valorisation of the Amazon (SPVEA). To be precise, one could say that the wave of development programs and the steady migration of population to Pará started with the construction of this highway, being expanded with the construction of the Transamazon highway. As a result new actors came onto the scene, and with them a new social dynamic was established. The outcome of this process is very much like what can be witnessed today in Pará.

The Belém-Brasilia highway is the starting point for the opening up of Pará because it provides for the first time a real link between southern Pará and the rest of the country. However, it is in the 1970s that the most "turbulent" roads were built in the Amazon, good examples are: the Transamazon highway, the PA-150, and the PA-279. The first represented the turning point when the main axis of the transportation system of southern Pará shifted from river to roads, the second linked the Belém-Brasilia highway to a point on the Tocantins river in Marabá, and the PA-279 reaching São Félix do Xingú, faced many problems during its construction due to the indefinite status of the Kayapo's Indian lands.[123] I use the term "turbulent" because these roads brought about an enormous social and environmental transformation into this area.

The construction of the Belém-Brasilia highway contributed to the problem of land concentration. The government of Pará saw an opportunity to sell its public land due to the attractiveness of the area after the construction of the Belém-Brasilia highway. Thus began the practice of selling large tracts of land to wealthy investors while those same areas were formally claimed by small farmers. This policy was frequently practised in the 1960s as well as the 1970s, which of course provoked the escalation of competition for land.

7.2 Environmental change in Pará: Evaluating its sources

Environmental change is a major feature of the current situation in Pará. The main forces behind environmental change in Pará are quite similar to those found at the regional level: cattle ranching followed by colonisation schemes and agricultural development, road building, mining, logging, and dam construction.

7.2.1 The clear connection between cows, pasture, and environmental change

Cattle ranching expanded rapidly in the 1960s and 1970s because of the opening up of the territory through the Belém-Brasilia highway, and due to the economic incentives allocated by SUDAM. Some authors (Fearnside, 1985 and Hecht, 1985) have pointed out that the motivation for ranching frequently has had more to do with land acquisition and speculation than with beef production. Economic analyses have revealed that ranching was not self-

[122] This corresponds to the military intention expressed by the strategist General Golbery do Couto e Silva, who formulated the idea to inundate the Amazonian forest with civilisation. Cited by Hetch and Cockburn (1989: pp.102-103).

[123] The highway department in the state of Pará began construction in 1976. The road started about twenty kilometres north of the town of Rio María until São Felix do Xingú.

supportive without subsidies or could only be profitable if it were practised in a shifting cultivation format involving overgrazing and land speculation (Hecht, Norgaard and Possio, 1988).

During the 1970s the newcomers quickly staked out land claims and converted large areas of forest to cattle pasture. It should be remembered that under the Brazilian legislation pasture was considered an improvement over standing forest. However, this policy did not promote settlement stability. On the contrary, many pastures were abandoned due to the decline in soil fertility. I would add two more factors: first of all, many small farmers abandoned pastures because of the amount of violence in Pará, especially threats made by large landowners, and secondly, the completely confusing policy of land titling did not contribute to settlement stability of small farmers. According to Matos and Uhl (1994) approximately 10 % of the eastern Amazon forest had been converted to pasture during 1960-90, yet bearing in mind the performance of the ranching sector was poor during this period.

The spread of ranching throughout the eastern Amazon, including southern Pará, is better understood when it is placed in the context of ranching in Brazil as a whole. During the last several decades ranching has been gradually pushed from the south of Brazil to the north. An important factor that has contributed to this has been the introduction of soybean in states such as Mato Grosso do Sul, which has caused an increase in land values and prompted ranchers there to sell and move further north. At the same time, the rapid growth of human population in the north has increased market demand for beef, helping to make ranching attractive. Considering this northward movement of the crop frontier, one could expect ranching to be relegated to less fertile soils, not prized for annual cropping such as those in southern Pará. Due to the above circumstances Matos and Uhl (1994) concluded that ranching will continue to replace forest in the Amazon unless forest-based land uses can show themselves to be more profitable than ranching, or unless there is decisive policy intervention.

As a final aspect it is important to ask *Why has ranching been expanding even in the absence of incentives?* The answer is that land is seen as a profitable investment, which increases in value faster than the rate of inflation. Thus, the productivity of land itself had little importance, cautious land management becomes irrelevant and environmental degradation is the inevitable result. Nevertheless, this situation changed a bit after the introduction of the *real plan* by Fernando Henrique Cardoso, due to the fact that the rate of inflation has been very low and consequently the margin for speculation has been reduced.

To summarise, ranching can be considered the most important source of environmental change in Pará. The most important environmental side effects have been deforestation and soil erosion. I have previously mentioned that around 90 % of Amazonian soil is already of poor quality and Pará is no exception. In that sense, the nutrients are contained in the biomass itself, which is destroyed after converting forest into pasture. The social side effects of ranching are related to settlement instability and land concentration. Those environmental and social side effects are important contributors to social stress in this state. This situation will be explained and developed later in this chapter.

7.2.2 Colonisation programs and agricultural development

Perhaps the second most important cause of environmental change in Pará has been colonisation schemes and the agricultural development it is associated with. Agriculture has always been practised in the Amazon, shifting cultivation being the dominant form of agriculture, especially slash-and-burn agriculture. To illustrate this there are more than five million people who that depend on subsistence agriculture for a livelihood in the Brazilian Amazon. Slash-and-burn is a form of cultivation in which the producer clears small areas of forest, burn the vegetation (perhaps selling off some timber), grow two or three harvests of food crops and then abandon the depleted soil to repeat the same process elsewhere (Hall,

1989: p.150). However, it is important to say that this system is not highly negative as long as there is not a dense population.[124] It has been stated that most of the soil in the Amazon cannot sustain an intensive agriculture, which makes shifting cultivation a necessary system.

In Pará the problem has been that the system of slash-and-burn has been practised intensively by small producers desperately searching for a livelihood. Incoming colonists often do not have the skill of indigenous farmers and old *colonos*, so they find it extremely difficult to adapt to the harsh environment. Population pressure and poverty elsewhere in Brazil explain the increment of this system. Another factor related to this system has to do with the land concentration problem in Pará. Thus, landless peasants destroy the forest for shifting cultivation because they are excluded from existing agricultural areas by the *latifundio* existent in this region. Thus, decreased yields, leaching, laterisation, weed invasion, soil erosion and permanent nutrient loss are the unavoidable results.

The relation between colonisation schemes and agricultural development is that the first one was aiming to promote the second one. The migration process that started in the 1960s with the construction of the Belém-Brasilia highway was accelerated in the 1970s with the construction of other roads such as the Transamazon. Over the course of several years this provoked a great increment in the agricultural area, but later the land was abandoned or converted to pasture.

Considering that most of the soil in Pará is comprised of Oxisols and Utisols, the challenge has been finding a way to develop agriculture while maintaining soil health. A recurrent problem has been the absence of an environmental survey before project implementation. For instance even when the government commissioned studies on the soil along the Transamazon highway, they did not appear until 1972 by which time the road had already reached Itaituba (Moran, 1989: p.72). In this case the data became available too late to affect policy.

It should be said that the first projects were clearly sponsored by the government. However, after the Geisel administration the government started to promote privately-sponsored colonisation, *Polamazonia* being the main tool for carrying out this idea. Those projects showed preferences for settlement in southern Pará. An important question is *Why would anyone buy land in a privately-run colonisation project, when land was available free from the public domain?* According to Smith (1982), one important reason for this seems to be that some farmers in southern Brazil had read about land violence between migrants and squatters, between immigrants and Indians, and the difficulty of obtaining titles of land. To corroborate this idea Moran (1990) shows that farmers in the private colonisation project in Tucumã, Pará[125] claimed that they preferred to pay for the land because in that way they avoided potential conflicts.[126]

It is crucial to mention that not all the settlement occurred under government initiative. Thus, many rural settlements occurred outside colonisation areas, on private or public lands. As Sawyer (1984) mentions, the relationship between cause and effect when it comes to

[124] For instance, Goodland (1984) points out that traditional burning techniques are normally far less destructive to the rainforest and more conducive than mechanised clearing with bulldozers.

[125] Tucumâ was developed by the Constructora Andrade Gutiérrez that obtained 400,000 hectares of land from INCRA in public auction for US$ 0.87 per hectare but with the obligation of building infrastructure and liberating the project within 6 years (Butler, 1985: p.41).

[126] However, the problem of security went out of control because the expansion of the area made it difficult to patrol the whole area. Thus, *grileiros* were still able to lay claims to land and force the company to purchase their claims in order to liberate the contested land for sale to incoming colonists (Butler, 1985: p.44). Moreover, the discovery of gold in the area aggravated the situation.

government policies and settlement programs is not clear, because policies were discontinuous, while migration was massive and continuous.

The contribution of the colonisation project to environmental change can be noted in the fact that in Pará deforestation is heavily concentrated in areas of especially rapid settlement that has been opened up by roads and spurred on by the availability of subsidised government funding under fiscal incentives, e.g. along the Carajás corridor, the municipality of Conceição do Araguaia, and the region centred around Marabá. According to some calculations made by Davis (1977), based on IBDF data during the period of the opening up of the Pará, settler farming was responsible for about 31 % of the deforestation.

In conclusion, cattle ranching and agricultural development (as a result of colonisation schemes) have been important contributors to environmental change in Pará. This process basically started in the 1960s, and accelerated in the 1970s and 1980s. The above can be noted in the fact that from 1977 to 1985 in the south of Pará, the rate of deforestation increased by almost 7,000 %, from 700 hectares in 1977 to over 47,000 hectares by 1985 (Hall, 1991: p.143). The colonisation and agricultural schemes have to be understood partially in the context of the unsuccessful policies of the Brazilian governments in solving the problem of land distribution and social gaps existing in Brazil. Thus, they have used the Amazon and especially states such as Pará by fuelling frontier settlements with pioneer farmers.

7.2.3 Dams: Magnets for economic development

Dam construction in Pará was intended to provide cheap electricity to stimulate industrial development in Brazil. A case in point is the Tucuruí dam built to supply subsidised energy for the multinational Aluminium Plant in Bacarena, Pará. It has been recognised that the state of Pará has an enormous potential for further development, especially around the Araguaia-Tocantins basin as well as in the Xingú basin.

The major hydroelectric project that has taken place in Pará is the Tucuruí dam on the Tocantins River. The environmental and social side effects have been notorious. The Tucuruí dam is the project with the largest area flooded in the Amazon accounting for approximately 2,500 km2. This project encroached on three indigenous people's reserves, and more directly affected at least six tribal groups totalling 800 individuals. Tucuruí created an artificial lake of 2,500 km2 of flooded land in three municipalities including 14 villages and three indigenous areas which were flooded (Monosowski, 1986: p.196).

The main social side effect of dam construction has been the displacement of people. On the western margins of the Tucuruí reservoir, the flooding of the highway caused the relocation of a large number of people. These people used to farm 100-hectare plots of land between 80 and 180 km of the Marabá-Altamira stretch of the BR-230 highway. Over 4,000 families lost their land, and approximately 1,000 were re-settled on the margin of the artificial lake in the area known as Gleba Parakanã (SEJUP, 1995). Finally, it is important to mention that the Tucurí reservoir drowned tens of thousand of Brazil nut trees. The Tocantins valley has always been the most important centre for the Brazilian nut trade, and certainly the area flooded has destroyed some of these resources.

I have pointed out in previous chapters the most frequent consequences of dams (flooding, relocation of people, spread of diseases). However, I want to draw attention to one which can be particularly important in Pará due to the concentration of settlement. This is the decline in fisheries. The productivity of fisheries appears to have declined mostly in the lower regions of the Tocantins in the vicinity of Cametá. Thus, the Tucuruí dam contributed to the collapse of the Mapará fishery on the lower Tocantins by closing off a spawning route and reducing plankton biomass. It is perhaps important not to exaggerate the impact, as indicated by Smith, Serrão, Alvim and Falesi (1995), because despite the fact that the composition of fish

communities has shifted below the Tucuruí dam, the overall impact of this barrier on fisheries has not proved especially serious from the perspective of local nutrition.

The second most significant hydroelectric project in Pará was located on the Xingú River. One of the largest Brazilian projects for energy production outlined in the 2010 plan was supposed to take place there. The hydroelectric complex would involve six major dams along its rivers (Cummings, 1990: p.64). The initial site for the complex was the town of Altamira, where the Transamazon highway crosses the Xingú River. Total generation potential for the whole project of six units was foreseen at 20,400 MW (Viveras de Castro and Andrade, 1988). It is interesting to see that the town of Altamira only required (in 1990) 40-50 MW, which means that most of the power from the Xingú complex was planned to be transferred to the urban and industrial centres of the north-eastern and southern states of Brazil.

The areas which would suffer the most direct impact from the project were those along the road and river routes from Altamira to the nearby town of Victoria, and along the 100 km of the Transamazon highway between Altamira and Belo Monte, including all the communities previously settled there by the government's colonisation projects (Cumming, 1990: pp.69-71). The opposition to this project by the Kayapó and other indigenous groups finally lead to dropping the project.

In short, dam construction in Pará has been a dynamic sector. The importance that this area has in the plan 2010 by Electrobras shows the significance of the state in providing cheap electricity to modern Brazilian industry.

7.2.4 Mining in Pará. Between formal and informal sectors

Mining has become the major economic activity in Pará. Both formal and informal sectors have experienced a great development. In a comparative perspective one could say that even though states such as Roraima and Pará account for a large sector of *garimpeiros*, there is a clear difference in terms of the formal sector. In Pará the corporate mining activities are more notorious than in Roraima, especially after the Carajás complex was opened.

The main corporate activity is localised in the Carajás corridor where the *Projeto Carajás* (PGC) was implemented. Under the policy of Polamazonia this iron-ore project was conceived as an export corridor, the first pig iron plant being installed in 1988.. The project is managed by the recent privatised company *Companhia do Vale do Rio Doce* (CVRD), and it is located around the Araguaia-Tocantins area where billions of tons of high grade iron-ore, bauxite, manganese, copper, nickel, and cassiterite were discovered (see table 16). Although officially started in 1978, the implementation of this project was intensified only after the federal government decided to support it with effective actions during the 1980s. The decree-law No.1813 gave top priority to the execution of the Carajás railroad and port complex, and an interministerial decision granted the full range of fiscal incentives to the iron-ore project (Neto, 1990: p.140). The tax incentives offered by the government attracted many companies to the region.

Table 14: Estimated reserves of minerals in the Serra dos Carajás by 1990 (in tons)

Mineral	Reserve in tons
Iron-ore	18 bn tons
Bauxite	4.7 bn tons
Copper ore	1 bn tons
Cassiterite	37mn tons
Manganese	60 mn tons
Nickel	2 mn tons
Gold	400 tons

Source: Cleary (1991) Special report for the Economist Intelligence Unit

The environmental side effects of mining operations are largely localised basically around the Carajás corridor and Serra Pelada. In principle, the consequences of mining *per se* are not dramatic, because of the limited area affected. However, the utilisation of charcoal has had repercussions in terms of forest cover in Pará. So, natural forest and *cerrados* have been used for the production of charcoal since then. It was estimated that by 1987, 372,000 hectares were being deforested annually in a 300 km corridor along the Carajás railroad (Silveira, 1993: p.186). A series of over thirty pig-iron smelter and other mineral processing plants along the railway corridor are the most serious threats to the environment. According to Hall (1991), these schemes approved by the Carajás council in 1987 will alone require the removal of over 5,000 hectares of forest annually to supply the one million tones of charcoal required to fire their burners.

When it comes to the social side effects one could see the formation of towns with the consequent population growth and the impact in terms of disturbance of some of the native people's way of living. Despite an official 1982 accord signed by CVRD, the World Bank, and FUNAI, the 13,000 Indians belonging to thirty-four tribal groups within the direct sphere of influence of the Carajás railway have apparently suffered numerous invasions of their territory by mining companies, *garimpeiros*, cattle ranchers, and loggers. As I noted before, the most important consequences of mining are derived from the activities with which it is associated. In the Carajás case this is quite evident, due to the fact that the infrastructure produced by this complex is responsible for the formation and growth of towns and population.

When it comes to population growth Marabá is a good example. Between 1980 and 1991 its population grew by 11.2 % (see table 12). The Carajás project and Serra Pelada had a strong impact on Marabá, leading to its subdivision in 1988, when the municipalities of Parauapebas and Curionópolis were created. By 1991 Marabá had become the third largest city in Pará, only after Belém and Santarém. Parauapebas is the clear example of a town created to support the mining activities of Carajás and another case is Curionópolis which originated basically from the informal gold exploitation in Serra Pelada. Both towns today are the focus of intense social conflicts, most of them caused by land dispute.

Table 15: Population growth in some municipalities along the Carajás corridor (1980-1991)

Municipalities	1980	1991	Annual growth %
São J. do Araguaia	12,163	19,768	4.5
Marabá	37,713	1,218,114	11.2
Cirionópolis	13,625	38,458	9.9
Parauapebas	8,577	53,016	18.0

Source: IBGE Censos demográficos 1980, 1991. Rio de Janeiro

The other important place in Pará for mining by corporate activities is the Trombetas bauxite area. This is an area in the Trombetas River discovered in 1967. The operation to exploit aluminium started in 1971 by a consortium led by CVRD and Alcan, with the participation of other multinational mineral groups.[127] In general, the corporate emphasis of mining in Pará has provided a link between the local, national, and international economy, due to the globalisation of productive activities.

As I have said, both the formal and informal mining sectors are present in Pará and developing greatly. In that sense the informal sector or *garimpagen*, has been developed in several areas, Serra Pelada and Tapajós being two of the most important areas. Serra Pelada located close to the town of Marabá south of Pará was the first *garimpo* to be taken over by the state. At its peak in 1983, it was producing more than a metric ton of gold per month and had a population of between 80,000 to 100,000 *garimpeiros* and traders (Cleary, 1990: p.164). The discovery of Serra Pelada is certainly related to the fact that rural violence in this area rose sharply, to the point that this was seen by the government as a potential threat to security. In this sense the intervention in Serra Pelada was the continuation of a process of direct federal involvement in the affairs of the region. The situation in Serra Pelada has also to be seen in the context of the rapid transformation of this area during the 1970s, basically provoked by the construction of different roads and the attraction of many smallholders, migrants, ranchers, and speculators, all of them comprising a conflictive social web.

The environmental consequences of Serra Pelada were clear in the area exploited, but not so much beyond it. In other words the area destroyed was small, although the destruction was total. It is well-known that the most significant consequences on the environment were caused by the *garimpos* and their use of mercury. However, as Cleary (1990) explains, the work practices in Serra Pelada were under the control of the *Departamento Nacional de Pesquisas Minerais* (DNPM), so mercury was prohibited, and DNPM technicians mounted an education drive, explaining the dangers to *garimpeiros.*

The second important place for informal mining in Pará (gold) has been along the Tapajós River. Here mercury pollution has been recognised as a real problem (Schonemberg 1994, Schmink & Wood 1992). The main problem is that mining is done in riverbeds, mainly by dredging alluvium from the river bottom. The above has provoked population displacement due to the fact that some *ribeirinhos* on the Tapajós river have moved to the hinterland, shifting economic activities to agriculture. In addition, this potentially provokes further deforestation.

[127] For instance the Royal Dutch Shell-Billiton, Companhia Brasileira de Aluminio, Reynolds, and Norsk Hydro.

7.2.5 Road building

During the 1960s and 1970s road building had a strong impact on the process of environmental change in Pará. The IBDF has estimated that from 1966 to 1975 road building was the third most important factor of environmental disruption after cattle ranching and settler farming. Road construction in the Amazon and Pará served two related goals: to provide access to a new economic frontier as well as to secure Brazilian territory. Examples of this are the Belém-Brasilia and the Transamazon highways. These highways were complemented by local roads in response to the preoccupation of occupying the region as quickly as possible. Thus, road building was the main tool for carrying out the imperatives of national integration and economic growth, and consequently a way to diffuse internal social conflicts in the south and north-east.

The clearest effects of road building were above all a shift in the activities from the main waterways to the roadside. Secondly, the roads had the power to turn natural resources, including land, into commodities that could be sold in national and international markets. Thirdly, the opening up of the territory consequentially aggravated the contests over land, minerals, and forest resources.

7.2.6 Logging

Logging was traditionally not an economic activity of great importance. The reason logging did not reach a high level of exploitation was, among other factors, due to the lower density of commercially valuable trees, in comparison with south Asia.[128] However, lately this activity has experienced a significant development. Table .18 shows how the logging contribution from Pará has increased dramatically in the last years: thus, from 86.9 % and 12.4 % in 1975 to 90.8% and 65.5% in 1989 for the Classic Amazon and Brazil respectively.

Table 16: Logging in Pará in thousand cubic metres and the equivalent percentage for the classic Amazon and Brazil (1975-1989).

State and region	1975	1980	1985	1989
Pará	3,942.1	10,283.9	16,361.7	43,138.7
Classic Amazon	86.9	89.6	82.7	90.8
Brazil	12.5	28.4	38.2	65.5

Source: IBGE, Produção Extrativa Vegetal 1975, 1980, 1985. IBGE Produção da Extração Vegetal e da Silvicultura 1989. Brazil. Taken from Silveira (1993).

In the Amazon there are around 350 commercially valuable species, but production is concentrated on few of them like mahogany (*Swietenia macrophylla*) which is now in danger of extinction, especially in areas such as Zona Bragantina in Pará, which is affected by the installation of around 3,000 sawmills (Hall, 1997: p.51). An important element is that logging has basically been done by small Brazilian operators instead of large multinational companies. However the recent operation of Asian companies in the area can change this landscape. For instance, Rinbunhan Hijau, the biggest timber company in the world, began operations in Pará

[128] However, the Amazon as a whole has experienced a large increment in logging. As it is cited by Hall (1997) and Schneider (1992) in 1975, the Amazon provided just 14 % of Brazil's wood production (4.5 million cubic metres), but by 1987 this figure had leapt to 54 % (24.6 million cubic metres). Moreover, this statistic does not take into account the illegal logging.

in 1997. This Malaysian company operating in 10 countries acquired three of the most important timber companies in the Amazon, Selvaplac and Maginco in Pará and Carolina in Amazonas (*O Globo*, 10/03/98).

There is a clear relation between road building and logging in Pará. As has been described in the above paragraphs, logging development has to do with the access facilitated by road building. A case in point is the PA-150, which opened access to the world's richest stand of mahogany trees. The PA-150 that connected Marabá to Conceição do Araguaia and Redencão completely transformed the timber industry in southern Pará.[129] The road not only promoted the exploitation for small operators, but also for medium and large companies. For instance we have the case of Georgia Pacific, which has a series of approximately 60 properties. The company's veneers plant produces 150,000 cubic metres annually, and supplies approximately 25 % of the North American market for tropical hardwood veneer (Fearnside, 1990: p.199). As we can see in table 16 logging production in the state of Pará rose enormously after 1985, much of it being concentrated around Marabá which coincides with its central location in terms of easier access by roads.

To conclude, the environmental side effects have been the exhaustion of forest reserves in Pará. The areas of ancient occupation have been exploited and covered with secondary forest for a long time. That is why the current exploitation is confined basically to areas of recent occupation. The social effects are related to the livelihood of native people and forest dwellers, especially for many nut-collectors who make their living from the forest, and who used to work close to Marabá, the area of most logging activity since the 1980s.

7.2.7 The outcome of environmental change

As done with Roraima (chapter VI), environmental change will be measured here through the rate and extent of deforestation. The data is from the two most reliable sources, namely the INPE estimates based on high-resolution satellite imagery, and the NASA project on habitat fragmentation in the Amazon.[130] In order to show the severity of the process of deforestation in Pará as well as follow the principle of looking at the links between subsystems and the system, the figures are presented here in comparative terms.

Table 17: Deforested area and affected area by edge effect in Pará and the legal Amazon 1978 & 1988 (km2)

State	Deforested area (km2)		Edge effect area (km2)	
	(1978)	(1988)	(1978)	(1988)
Pará	30,449	95,075	49,791	116,669
Legal Amazon	78,268	230,324	208,229	587,604

Source: Skole & Tucker (1987)

[129] In Pará the golden years of mahogany production were over by 1981.

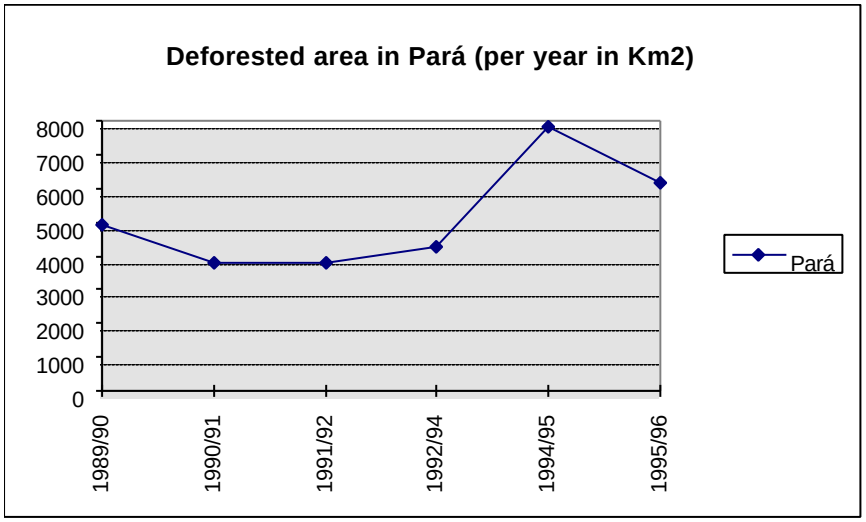
[130] The NASA project known as *Humid Tropical Forest Inventory Project* was under the leadership of David Skole and Compton Tucker.

Table 18: Comparative evolution of deforestation in Pará and the legal Amazon 1990-1996 (km2)

State	1990	1992	1994	1996
Pará	144,200	151,787	160,355	176,138
Legal Amazon	426,400	440,186	469,978	517,069

Source: INPE http://www.inpe.br/amz-04.htm

Graph 8: Pará's area deforested annually in km2 (1989-1996)



Source: INPE http://www.inpe.br/amz-04.htm

The two general conclusions that can be deduced from the data shown above are: First, Pará is one of the major contributors of deforestation in the Amazon. A safe generalisation from the data is to argue that in proportional terms Pará clearly accounts for more than 30 % of the deforestation in the legal Amazon, for instance 34 % in 1996. The second conclusion is that the level of deforestation has not been growing constantly. On the contrary it has experienced of ups and downs. If one takes the data of graph .8 in relative terms it is possible to conclude that there has not been a continuous growth of the area deforested per year. The period 1990-92 experienced a small decrease in relative terms from an annual rate of 0.47 % during 1989-90 to 037 % during 1990-92. However, the current levels are still high, so the data for the year 1995-96 show that the area deforested that year was greater than the area of 1989-90. In relative terms the increment was from 0.47 % in 1989-90 to 0.62 % in 1995-96. In short, these up and down periods show that the deforestation process is conditioned by short-term factors.

7.3 Allocation of resources: How inefficient has it been?

In the Amazon as a whole we have witnessed how government intervention in many ways has contributed to generating environmental change. Several scholars (Hecht, 1985; Binswanger, 1987; Mahar, 1989; Foy & Daly, 1992) have exposed how the structure of taxes and fiscal incentives have influenced the management of the Amazon basin. Here I argue that some of these taxes and incentives have contributed not only to accelerating the process of environmental change, but they have also affected the configuration of social conflicts in Pará. For instance, the fact that successive governments have subsidised land acquisition in

Pará through commercial and speculative interests has promoted a conflictive process of possession and expulsion linked to the ownership of land.

The allocation category emphasises the incentives of private economic agents in response to government fiscal rules and property right structures (Foy & Daly, 1992: p.51). For instance, in 1966 *Operation Amazônia* introduced a series of fiscal incentives to be financed through the Amazon Bank (BASA). SUDAM was the main tool for channelling those incentives.[131] In general terms the tax policy, the land tenure policy, and the fiscal incentives have been the determining factors of misallocation in Pará.

Most of the subsidies given by SUDAM in Pará went to ranching. Pará was the Amazonian state that got the highest number of projects financed by SUDAM (see table 20). It is important to note that only the area of Conceição do Araguaia in the south of Pará got 32 projects (Poelhekke, 1986: p.36) in comparison with states such as Amazonas and Amapá, which until 1982 got only 18 and 6 respectively. Thus, Conceição do Araguaia received the largest number of any *municipio* in the Amazon, becoming nationally recognised as the major cattle ranching area. Table 19 shows the growth of cattle in Pará in comparison with other Amazonian states. Looking at table 19 and 20 as well, one could perceive a preliminary relationship between subsidies for cattle ranching and the development of conflicts, by virtue of the geographical association between these two aspects. A combination of data from the Pastoral Land Commission Pará and the Movimento dos Trabalhadores Rurais Sem Terra shows that Pará is the state of the classic Amazon with most land conflicts reported. For instance, as can be seen in tables 25 & 26 as well as in graph 9, during the period 1980-1997 it has been reported 449 casualties, including mostly *posseiros*, landless, and *peões* (land workers).

Table 19: Comparative annual growth of cattle in Pará and other Amazonian states (1975-85)

States	1975	1980	1985
Parà	2.1 %	12.8 %	4.9 %
Amazonas	6.2 %	11.2 %	3.4 %
Acre	8.0 %	17.8 %	2.6 %
Amapá	3.6 %	-6.1 %	0.4 %
Rondônia	19.0 %	30.3 %	22.3 %
Roraima	3.6 %	4.9 %	-0.7 %
Classic Amazonia	3.2 %	12.6 %	5.9 %

Source: Agricultural Census. 1970, 1980, 1985.

The SUDAM ranches in Pará were subsidised in several ways, for instance:

a. Fiscal incentives. SUDAM ranches received grants of up to 75 % of the ranch development costs in order to encourage corporate groups to invest.

[131] The creation of SUDAM was accompanied in the 1960s by parallel efforts of the military regime to overhaul the legal and bureaucratic agencies and regulations governing the use of land. For instance, the Land Statute in 1964 was issued together with a Forest Code in 1965, and article 198 of the constitution gave native peoples exclusive rights to ancestral territories.

b. Tax holidays of up to 100 % of corporations tax bills were forgiven if this money were invested in holdings.
c. No import taxes were charged for equipment used on those ranches.
d. Subsidised credits were widely available at essentially negative interest rates.

Land concessions were provided in many areas or land was provided at nominal cost (Hecht, 1993a: pp.12-13).

As a result great speculation took place especially in areas of easier access such as along the Belém-Brasilia highway and its feeder roads. Land became an instrument of speculation. Due to the incentives mentioned above most of the investors chose to concentrate on livestock production, and consequentially land values rose enormously, while forests were cleared and replaced by pasture on the assumption that soils which had supported forests were by definition fertile. The following table will show how most of the incentives for ranching went to Pará in comparison with other states of the classic Amazonia. Places such as Conceição do Araguaia, Santana do Araguaia, Paragominas in the state of Pará accounted for most of the projects.

Table 20: Cattle ranching projects financed by SUDAM in the classic Amazon until 1986

States	Number of projects	area (1,000 ha)
Pará	109	1.786
Amazonas	18	111
Amapá	6	53
Acre	4	220
Rondônia	1	30
Roraima	-	-

Commutative data-projects for cattle ranching, 1982, SUDAM. Cited by Poelhekke (1986)

As we know, allocation can be efficient or inefficient. In the case of Pará the allocation of resources through SUDAM provoked a very speculative movement with negative consequences in terms of environmental effects as well as social unrest. According to Fearnside (1985), in 1979 SUDAM stopped granting new fiscal incentives for pasture formation in the high forest of the Amazon, but allowed new projects only in the transition forest. The direct subsidies for livestock were suspended with the New Republic by President José Sarney. However SUDAM, through FINAM has continued to support some corporate activities in the Amazon. Lately the newspaper *O Liberal* (10/03/98) reported irregularities in the allocation of incentives to several companies in Pará and Mato Grosso during the period 1992-97.

7.4 Maldistribution or no distribution in Pará?

In Pará there are reasons to associate land concentration with social conflicts. It goes without saying that the land distribution issued has to do with the survival of important social groups such as small farmers and landless. The access and possession of land is clearly the most important factors for securing the livelihoods of these groups. In Pará by 1985 there was a situation in which the state's 1 % *latifundia* (1,000+ ha) covered 52 % of the farmland (see table 21). On the other hand, small holders in Pará (0-10 ha) accounted for 33.0 % but they had just 1.3 % of the arable land.

Table 21: Distribution of land ownership in Pará (1985)

Property size (ha)	N	A
0-9	33.0	1.3
10-99	51.7	19.4
100-999	14.3	26.6
1,000-9,999	0.9	23.0
10,000+	0.1	29.7

N: Percent of farmers. **A**: Farm land
Source: IBGE 1987

As a result of the concentration problem the GINI coefficient of land ownership worsened steadily from 0.82 in 1960 to 0.88 by 1972 (Hall, 1991: p.100). The 1980s witnessed some improvement though it was still high. Thus, as is shown in table 22, in 1975 the index of concentration of land holdings in Pará was 0.86, going down in 1980 to 0.84 and to 0.82 in 1985. The above situation parallels the tendency for the whole classic Amazon. Thus, the GINI coefficient of land concentration for the legal Amazon has been diminishing from 0.865 in 1975 to 0.830 in 1980 to 0.795 in 1985 (Mueller, 1987).

Table 22: Indices of Concentration of Land Holdings in Pará, the classic Amazon, and Brazil (1975-1985)

State/Region	1975	1980	1985
Pará	0.86	0.84	0.82
Classic Amazon	0.86	0.83	0.79
Brazil	0.85	0.85	0.85

Source: Data from different sources, Muller (1987); Hoffmann (1989), and Schneider (1995)

A preliminary relationship can be established between allocation and distribution in Pará. As is indicated in table 23, the percentage of rural properties under 10 hectares fell dramatically during the period of fiscal incentives, for example in Marabá it dropped from 71 % to 2.7 %. In the same way the amount of farmland cultivated by small farmers diminished considerably. This phenomenon has been accompanied by an increase in the control of farmland by large owners. For instance, in the case of Araguaia, the share of farmland in units from 100 to 1,000 hectares increased from 5 % to 16.4 %. However, it is important to mention that if one pays attention to the properties between 10 and 100 hectares the percentage of farmers in both localities experienced a great increase. Nevertheless, this increment does not reflect so much of the arable land available to disposition for the new farmers. The increase in the percentage of farmers could reflect upon peasant colonisation programs either sponsored by the state or spontaneous colonisation during the 1970s.

Finally, to illustrate this, table 23 shows the situation of land ownership in Marabá and Araguaia, two areas of strong fiscal incentives and land conflicts. Looking at the numbers provided by the Pastoral Land Commission, out of the 291 victims of land conflicts in Pará during 1985-97 around 70 were killed in the areas of Marabá and the region of Araguaia (CPT Report, 1998). Even though some of the above numbers of casualties and the allocation and

distribution data are not from the same period, it has to be understood that variables such as allocation and distribution can influence the dynamics of conflict beyond the temporal limits of the application of such incentives and subsidies.

Table 23: Changes in land ownership in Marabá and Araguaia region (1970-85)

	Marabá						Araguaia					
Property (ha)	1970		1980		1985		1970		1980		1985	
Size	N	A	N	A	N	A	N	A	N	A	N	A
0-9	71.0	0.9	2.7	0.03	10.0	0.3	33.2	0.4	9.3	0.01	8.9	0.2
10-99	21.4	3.7	37.9	6.3	60.4	18.6	57.1	11.3	68.7	16.0	68.2	11.6
100-999	2.8	3.4	50.0	27.2	27.6	1.6	6.8	4.9	19.3	14.7	20.4	16.4
1000-9999	4.5	83.7	5.4	40.7	1.9	35.2	2.4	31.0	2.1	21.2	2.2	7.9
10,000+	0.1	8.3	4.0	25.8	0.09	14.3	0.5	52.4	0.6	48.0	0.3	53.9

Source: IBGE (1975, 1984, 1987), and Hall (1991).

Another area of high land concentration is Xinguara. By 1985 this town located between the long established towns of Conceição do Araguaia and Marabá presented a situation in which small holders represented 61 % of the total holdings, but they owned only 15 % of the land. Just forty-three property owners controlled 163,474 hectares, or about a quarter of the entire *município* (Schmink & Wood, 1992: p.180).

To conclude, it can be noted that in principle there is an association of the variable allocation and distribution. It should be said that the allocation of resources given through SUDAM did not improve the distribution of land. Most of the incentives given by SUDAM went to larger enterprises controlled by investors from outside the Amazon. Moreover, there is a geographical relationship in terms of the areas where resources were allocated, a worsening of the land concentration and higher number of casualties.

The above situation is understandable because, on the one hand, heavily subsidised commercial and speculative interests were promoted in Pará, while at the same time, however, the government encouraged land-hungry peasant farmers expelled from north-eastern and southern Brazil to settle in the new agricultural and economic frontiers. Hence the escalation of violence in Pará is highly attributed to the continuous struggle over access to land between different competitive groups.

7.5 Population growth

This independent variable is particularly important in Pará because it shows: first, that there is a geographical relationship between the areas of most intense frontier development and the areas with the highest population growth, second, it shows a process of urbanisation despite low population density, and finally, it displays that there is still a migration process taking place even though the fertility rate has decreased for the whole country. What is more important according to some studies (Ozôrio de Almeida, 1995), is that there is a shift in the migration pattern. Migration posted in the 1980s is more internal than interregional, like it was before.

I argue that before the 1980s the frontier dynamic was the main factor responsible for bringing people to Pará. In fact, the conceptualisation of Pará as a resource frontier as well as an empty space motivated a large migration of people to Pará. This can be noted in the fact that the municipalities in southern Pará with the highest population growth in the 1980s were

those in which most of the mechanisms of frontier development (roads and allocation of resources) were implemented (see table 24). For instance, the Transamazon connected towns in the south of Pará such as Marabá, Itaituba and Altamira which experienced a high population growth. To illustrate the towns of rapid population growth in the 1980s in Pará, the following can be cited: Conceição do Araguaia (15.08 %); Marabá (9.36 %); Altamira (11.73 %), Itaituba (11.63 %); Itupiranga (11.32 %); Paragominas (13.01 %); Tucurui (19.93 %).[132]

A second interesting fact is that even though average rates of fertility in Brazil and the Amazon have been falling (from 5.6 in 1965 to 3.2 for 1990), it has not resulted in a reduction in the rates of migration and urban growth (Ozório de Almeida 1995: p.13). Thus, the average annual increase of population in Pará has been not so different during the decades 1970-80 and 1980-90, being 4,6 and 3,6 respectively (IBGE Censos Demográficos, 1991). The above shows that internal migration in the Amazon and Pará is not spurred on by population increase, but by economic opportunities, basically the idea of earning a living in urban areas.

Table 24: Population growth. Annual increases and total increase (%) in the areas of Pará (1980-91)

Areas	Pop. 1980	Pop. 1991	Annual increase	Total increase
Pará	3,403,391	5,084,726	3.7 %	49.4 %
Low Amazonas	440,116	560,022	2.2 %	27.2 %
Marajó	265,025	316,046	1.6 %	19.3 %
Belém	1,162,002	1,621,899	3.1 %	39.6 %
North-east	994,615	1,197,508	1.7 %	20.4 %
South-east	392,234	964,643	8.5 %	145.9 %
South-west	149,399	424,608	10.0 %	184.2 %

Source: Silveira (1994). Taken from IBGE, Censos Demgoráficos 1990.

The third notable factor is that the urbanisation process in Pará takes place despite a low population density in comparison with other, primarily southern, Brazilian states. According to the Censo Demográfico (1991), Pará had 1,115,885 people registered as rural population and 1,331,753 as urban. This in a territory whose density is not very high. Thus, the population density of Pará per km2 was in the 1970s (1.76), in the 1980s (2.78), and by 1991 (4.2). According to the new 1996 census by IBGE, the total population of Pará is 5,510,849, which represents a population density of about 5 people per km2. In connection with this point, it can be noted that the increase in the urban population in Pará is even higher than the increase in the rate of the population as a whole. For instance, in the decade 1970-80 there was a 5.0 % annual increase and from 1980-91 a 4.0 (IBGE 1991). It is for that reason that some authors such as Becker (1987) argue that the occupation of the Amazon frontier has been done on an urban basis, using strategies that lead to the accumulation of an urban army, which is a precondition for industrialisation.

[132] Data taken from María José Jackson Costa "*Demografía e Mã*o *de Obra na Amazônia*", 1990.

7.6 Understanding social conflicts in Pará. On conflict issues

The following pages attempt to show the dynamics of social conflicts in Pará. The dynamics will be presented through the grouping of these social conflicts into three main issues. They are: (a) land conflicts, (b) mineral conflicts, and (c) conflicts over Indian lands. The above classification of issues does not mean that they are independent of each other. As this section develops, it will be perceived how they are part of a whole and even overlap in some scenarios.

a. Land conflicts

Land conflicts in Pará have a long historical background fed in many ways by the kind of development experienced in the region. A safe generalisation is to say that the land issue is the most important conflict issue in Pará. In fact, as I will show, most of the casualties in Pará due to social conflicts are related to land disputes. Moreover, land conflicts can be placed basically in the typology of consensual conflicts, because the dispute over land as a valued object is based on the need for gaining possession and ownership of land. Finally, it is my belief that the fact that land conflicts are basically consensual and not dissensual means that they tend to be intense.

b. Mineral conflicts

Conflicts over mineral resources is something familiar to the whole Amazon, and in the case of Pará reaches an enormous development in two dimensions, namely: *garimpagen* and formal sector activities. The cases of Serra Pelada and *Projeto Grande Carajás* (PGC) are good examples of both dimensions. The conflicts have been so notorious that they have led to the militarisation of the mining issue. In terms of mineral conflicts there is a combination of typology. In fact, even though some conflicts are in the form of a dispute over the ownership of the mineral site, as in the case of Serra Pelada, others, like the exploitation on the Kayapó land, may also have a dissensual nature. Disputes have been settled around norms, and rights when it comes to mineral exploitation. Thus, mineral conflicts in Pará have reached the manifest level, however the intensity is lower than the ones found around the land issue.

c. Conflicts over Indian lands

Conflicts over Indian lands has been the third most important conflict issue in Pará. This conflict issue presents a mixed typology of consensual and dissensual conflict. Consensual types are experienced basically due to the dispute over the demarcation of Indian lands. Dissensual types are due to the fact that for the most part the conflicts between Indians and *garimpeiros* can be understood in terms of rights to exploit gold and timber. Thus, in this case the dispute has not been exactly related to the possession of the value-object, but to differences in norms and rights on the way of utilising the mineral site and the forest. The Kayapó reserve in terms of mining and the Xicrin Catete area in relation to logging are good examples. This type of conflict has not been highly intense in Pará even though the manifest stage has been reached. The lower intensity can be related to the dissensual nature in some of the cases, as well as the process of negotiation that has been established between the parts involved. However, in most scenarios a combination of consensual and dissensual conflicts in perceived.

7.6.1 The golden land. A problem beyond scarcity

The land problem is related to a broad range of economic, political, and social activities. We have witnessed through the development of this dissertation how land resources bind humans and the environment together in a complex state of dependence. Land conflicts are nothing new, either in the Amazon or in Pará. According to several sources, during the

military period and the first year of the new republic (1964-1986) some 1,500 people died in Brazilian land conflicts (MIRAD 1986, 1987, MST 1987, and Amnesty International 1988).

7.6.1.1 Main historical factors related to land conflicts in Pará

Land possession in Brazil has been a symbol of power, based on an Iberoamerican tradition. As a result, the primary objective of the ruling class has been to prevent any reorganisation of land tenure, the basis of its wealth and influence. Since the constitution of Brazil as a state, the agrarian question has been a leading issue in Brazilian policy. Nevertheless, in the second half of the 20th century the land question became the most important ground for conflicts in the Amazon. At a general level, the most important factors contributing to social unrest in the land issue are: the policy of land titling, the nature of the Amazonian economy, the *aforamento* system, the system of *posse*, SUDAM incentives, and land concentration.

Regarding land titling the rule has been a somewhat arbitrary system of land ownership. Many cases have been reported in which one piece of land has more than three owners. Solving this problem in Pará has been a daunting task initiated even before the military took over, but remaining far from settled when the military stepped down. Before the military came to power in 1964 an enormous amount of land was sold to private owners. The problem of land titling has been well treated by Schmink & Wood (1992). Numbers reveal that between 1959 and 1963 alone, state agencies sold over 5.6 million hectares in a series of poorly documented and legally suspect transactions. When the military appointed Jarbas Pasarinho as governor of Pará in 1964, one of his first acts was to revoke all previous legislation and turn the control of state agrarian policy over to the Secretariat of Agriculture (SAGRI). The measure was not implemented until 1965, after the election of his successor, Alicid Nunes, who demanded a review of all land sales back to 1954 (Schmink & Wood, 1992: p.63).

As a consequence of the decrees by Pasarinho and Nunes, thousands of title applications were stalled within the bureaucracy, many of which were of dubious legality from the beginning. In 1975, a new agency called the Land Institute of Pará (ITERPA), took over for SAGRI and again suspended all titling in order to attend to thousands of pending cases. A special decree permitted the repurchase of land acquired irregularly prior to 1964. In 1977 INCRA and ITERPA called for a review of all existing *aforamentos*. Those that did not meet the legal requirement for payment of the lease were cancelled. In other cases, federal authorities resorted to an attempt to transform *aforamento* into short-term concessions by bringing disputed lands into the federal domain (Schmink & Wood, 1992: p.65).

A second factor introducing confusion was the extractive nature of the Amazonian economy, which made it especially difficult to define property rights in a manner compatible with the standard spelled out in the bureaucratic procedures. As pointed out by Schmink and Wood (1992), legal protocols assumed neatly surveyed plots of land, but this bore little relationship to the vast expanse of territory controlled by powerful economic groups who made their income from the extraction of rubber and Brazil nuts, and who thought more in terms of the distribution of trees than in the acreage of land.

The third historical factor has been the *aforamento* system. I mentioned at the beginning of this chapter how the state of Pará granted *aforamentos* in the Marabá region, a category of land tenure that amounted to perpetual leases to exploit forest products. In effect the arrangement meant that the enormous tracts of land in southern Pará fell into a nebulous legal realm somewhere between private and public property. I would argue that the system of *aforamentos* could be considered the most important historical element explaining land concentration in Pará, since state land legislation passed in 1920 and again in 1954 permitted the acquisition of large areas of land through the *aforamento* system.

The fourth factor has to do with the *industria de posse* (land claims industry). As the word indicates, this system is based on *de facto* possession. It has been a tradition for long time in the Amazon to occupy one given area, to clear it, to claim it as property, and finally to sell it. Selling the property in many cases is a direct result of the threat of violence by large owners and/or *grileiros.* Therefore, the safest and most profitable path for new *colonos* has been to sell the property instead of fighting to occupy it permanently. In the case of Pará large areas of the state were appropriated through this method. The confusion that this system introduced becomes clear if one thinks for instance of the large amount of land assigned through the *aforamento* system and later on through SUDAM. Most of these areas were not under surveillance and therefore facilitated the *industria de posse.*

The fifth factor is related to SUDAM incentives. It is important to note how there has not been any consistency in the main aims when it comes to planning in the Brazilian Amazon. For instance, the National Integration Plan (PIN), formulated in 1970 during a visit by president Medici to north-east Brazil, was clearly meant to support small farmers in the Amazon. The main way of doing so was by building roads (Transamazon and Cuiabá-Santarém) and distributing plots of land among the migrants. However, a few years later this policy shifted from being geared towards small farmers to large-scale projects. The origin of the change can be found in POLAMAZONIA, a development program launched in 1974 to create sixteen poles in the Amazon. Pará contained poles 1 (Xingú-Araguaia) and pole 3 (Araguaia-Tocantins). Those areas received large-scale support from SUDAM for cattle ranching.[133]

Finally, land concentration has been a permanent feature of the land issue in the Amazon as well as Pará. The conflicts between migrant farmers, *posseiros*, *sem terra*, ranchers, land speculators, and corporate investors are very much a product of land concentration. I need not go further into this aspect here because it has previously been explained.

7.6.1.2 The handling of the agrarian question by the military in Pará

During the military regime (1964-85) the land issue was not forgotten. On the contrary, the direct participation of the military government played an essential role. The question is *Why did the military decided to intervene in the land issue?* The handling of the agrarian question by the military has to be understood within the political context of the centralisation promoted by the *junta.* Hence, the decision of the military to intervene in the land issue is related to the goal of securing internal order as well as the *developmentalism* idea. The period of military rule meant centralisation of political power that took place in a number of realms, including the strengthening of the executive at the expense of the legislative branch, and the strengthening of federal power to the detriment of regional and local interest.

As was pointed out in Chapter V and VI one of the features of the Brazilian State has been that centralisation is perceived as essential to assure internal security. This factor explains the involvement of the state in land conflicts and could be illustrated by the creation of the *Grupo Executivo de Terras do Araguaia-Tocantins* (GETAT), the nature and performance of which will be explained below. A recent example of such intervention is found in Parauapebas, Pará, when, in April 1998, a number of 500 soldiers under the leadership of General Antonio de Sã Rocha directly intervened, taking control of the area because of the land conflicts and the general social unrest in the area (*O Liberal*, 01/04/98).

[133] This idea was reinforced in the second Development Plan for the Amazon (1975-1979), in which it was argued that the indiscriminate migration of poorly educated groups without capital to invest, and the use of rudimentary technology only exacerbated problems that already plagued the region.

What has centralisation to do with the land issue? After 1964, the relationship between centralisation, economic growth, and land conflicts could be found in the decision taken in 1970 to colonise the ten kilometres on either side of the new highways. Federal control was subsequently expanded in 1971 to include two hundred-kilometre strips along the roads. This land, under the control of the National Security Council, was effectively placed under military rule (Pinto, 1980: pp.121-38). From that moment on, public land that had once belonged to the state became federal property. As a result, it has become practically impossible to separate the land question from the militarisation of rural areas in the Amazon. As indicated by Martins (1982), the appropriation of land as well as the mechanism to distribute land was the tool used by the military to impose their power over merchants and traditional landowners.[134]

7.6.1.3 The social question of the landless and the Araguaia war

The social gaps existing in Pará and elsewhere in Brazil have undoubtedly played a vital role in the structure of land conflicts in Pará. The first revolutionary experience in the Amazon and in Pará can be related to such social gaps. In 1960 members of the Communist Party of Brazil (PC do B) found the right ground to develop their ideas by virtue of the poverty and social violence experienced by migrants in Pará. Thus, at the end of the 1960s and beginning of the 1970s a small subversive group started activities in the region giving rise to the so-called *guerrilla do Araguaia.* Even though this group never reached an important size to constitute a real threat to the government, it was part of the whole unstable situation around this area.

In mid 1973 the army adopted a new counter-insurgency strategy under the leadership of Sebastião Rodriguez de Moura (Curió, as he was nicknamed, would later in the 1980s command the federal take-over of Serra Pelada and temporarily become the dominant political figure of Marabá). Under Curió's command, small groups of special forces units defeated the guerrilla by the middle of 1974. What is important about this operation is that at the end Curió concluded that military action was only part of the solution, so he claimed that if Brazil was to avoid further political movements of this type, it was necessary to follow the insurgent's example of extending needed services to the rural population (Schmink & Wood, 1992: p.73). The above argument shows how the variable social gaps and maldistribution have played a substantive role in the configuration of conflicts in the Amazon, and certainly have been an important trigger of land conflicts in Pará. As a result of these ideas GETAT was subsequently created. Since the Araguaia war a sort of military populism was practised in the region and GETAT was a clear example of this.

The final defeat of the guerrilla had an important implication in terms of policy. From this moment the federal government abandoned its policy of official colonisation of Amazonian land, replacing it with a policy that favoured colonisation through private enterprise, which would benefit from large land grants for this purpose. However, at the end of this decade the state would come back to the area with GETAT.

7.6.1.4 GETAT and the military populism

The beginning of the 1970s showed the incapacity of bureaucratic procedures to resolve the land dispute and to diminish the number of deaths resulting from land disputes in some areas of particular violence such as Araguaia and the Tocantins river in southern Pará. Thus,

[134] In a recent work by Martins (1995), he pointed out that in Brazil the handling of the agrarian situation by the military could be called the pendulum movement of power in Brazil, because the dynamics of power is regulated by an alternating cycle of power between the oligarchies and the military. The above occurs between decentralised governments organised on a local or regional power, and centralised government under strong military control.

in a definite attempt to control the land issue in 1979 President Figueiredo asked the National Security Council to evaluate the social conflicts taking place in this region. As a result of such evaluation the Executive Group for Araguaia-Tocantins Lands (GETAT) was established. The immediate implication of GETAT was that the role of INCRA was reduced significantly, because GETAT was then the institution responsible for allocating land to *posseiros*. Instead of giving land along the Transamazon highway as INCRA did, GETAT allocated land to *posseiros* already involved in land conflicts. In other words, the idea was not to promote colonisation as INCRA did, but to resolve local land dispute in hot spots by converting public land into private property.[135] However, GETAT also purchased land from large owners. For instance, when a ranch became the target of an invasion by small farmers the solution was to make a deal with the rancher. The deal could involve the purchase of the rancher's land, or to provide the rancher with a title for a larger area in a different location.

The strategy used by GETAT to cope with the emerging social unrest in this area was to offer certain titles to landless people who had the capacity to organise social movements. The power of GETAT was so significant that they intervened in many different areas. For instance they were partially responsible for the deforestation growth during these years, because they suspended the forestry regulation for colonists stated by the Brazilian Institute for Forest Development (IBDF) in areas controlled by GETAT. Moreover, in order to give land to as many people as possible GETAT halved the minimum size of agricultural plots in Amazonia from one hundred to fifty hectares.

GETAT also influenced land concentration because it used to solve many land invasions by giving land titles to ranchers for a larger area in another place where conflicts with *posseiros* were not detected. As pointed out by Hall (1991), from 1980-85 over five million hectares were demarcated by GETAT, but most of this was in the hands of large owners. Some 70 % of titles were for farms under 100 hectares, but these accounted for only 21 % of the total area legalised, while 8 % of properties over 300 hectares took up 51 % of the titled land. It cannot be said that GETAT resolved the social conflicts in the area, however its populism provoked that a least for a while conflicts were reduced. After 1984, GETAT came under severe criticism as was abolished in 1987, the same year that the New Republic revoked decree law 1164, thereby relinquishing federal control over the Amazon land designated as national security areas.

To conclude, I should mention that the monopoly of violence by the military did not mean that violent action by large landowners did not take place, thus violent actions occurred in hundreds of places in the interior. That is why it can be argued that the *latifundio* has been an institution of violence, which provoked in many cases the subordination of public authority to private interests, especially in remote parts of the Amazon.

7.6.1.5 Land reform as the Achilles heel of social stability in Pará

The preoccupation with land reform in Brazil is not new, and in fact was a core element of the Amazonian policy even before the military coup. The central preoccupation in almost all the plans has been the distribution of plots and land titles as a mechanism for regulating social stress in Brazil and the Amazon. In many ways it could be argued that through these plans the Amazon has imported part of the violence from other areas of Brazil.

The origin of the discussion on agrarian reforms can be traced back to the 1950s. However, it was not until 1962 that an institution was created to deal with such reforms. Thus, the *Superintêndencia de Politica Agrária* (SUPRA) was established in order to carry out a plan of

[135] However, it should be indicated that GETAT participated in a few resettlement projects such as Carajás I, II, III located near to the iron-ore complex.

agrarian reform. Even though the nature of this particular process was interrupted by the military in 1964, this does not mean that the coup excluded land reform from the political agenda. On the contrary, they installed a group that issued a very important document in the history of agrarian policy in Brazil, the so-called *Estatuto da Terra* law 4.504 (Land Statute), in November of 1964. This was a progressive legislation whose main goal was the redistribution of under-utilised public or private lands to small farmers and the landless.[136] A major difference with the Land reform plan of 1985 is the idea of reforming the *latifundios.* In the Land Statute a different criterion for expropriation was established, using *size* and *uses* of properties as main elements, not only the criteria of *non-productive* and *productive* land as in the 1985 plan.

In the 1970s, the distribution of plots was the strategy used by the government to avoid a serious land reform.[137] The results of these plans were not positive, few families were allocated and the GINI coefficient of land concentration remained high. As a result of this policy's failure and the growing social unrest in the region, a more radical plan of agrarian reform was formulated in May 1985. The new government of José Sarney formulated the National Agrarian Reform Plan (PNRA 1985-89) issued two months after the change of regime by the newly-formed Ministry of Agrarian Reform and Development (MIRAD).

MIRAD planned to redistribute a total of some forty-three million hectares of under-utilised public and private property to some 1.4 million landless peasant families by 1989 and seven million by the year 2.000 (MIRAD, 1985). In the classic Amazon a total of ten million hectares was to be redistributed by 1989 to resettle 630,000 landless families. However, as Groppo (1996) indicates, by 1989 the federal government settled 83.625 families in 515 settlements. These settlements occupied 4.17 million hectares, slightly more than 10 % of the proposed in 1985.

The mere talk of land reform caused an escalation in rural violence in Pará. As can be seen in table 25, around 1985 and 1986 there was a dramatic increase in the number of casualties in land conflicts in Pará in relation to previous years. To quote Schmink & Wood (1992) the land reform plan was interpreted by the landless in the Amazon and elsewhere in Brazil as a license to take matters into their own hands. For instance, in southern Pará, the Tucumã private colonisation project became a site of a massive land invasion. Landowners across the country responded to these events by creating their own armed militias and by establishing the Rural Democratic Union (UDR), an organisation formed by the main landowners of the Amazon. A particularly turbulent area was around Marabá, in connection with that a branch of the *União Democratica Ruralista* (UDR) was installed in Paragominas, north-east of Marabá.[138] The large ranchers in the region began to recruit private militias to defend themselves against land invasions by small farmers.

---

[136] In order to carry out the Land Statute, the law created the Brazilian Institute for Agrarian Reform (IBRA) and the National Institute for Agricultural Development (INDA). In 1971, IBRA and INDA were merged into the National Institute for Rural Settlement and Agrarian Reform (INCRA). That was an autonomous federal government entity. Thus, the focus changed from agrarian reform to settlement.

[137] Examples are The National Integration Plan (1970), Programa de Redistribuic ão de Terras e de Estímulo Agroindustria do Norte o Nordeste, or PROTERRA (1971), POLAMAZONIA (1974), and POLONOROESTE (1974). All of these are examples of the strategy of colonisation and land reform through distribution of lots in the Amazon.

[138] A young rancher named Ronaldo Caiado from Mato Grosso founded the Rural Democratic Union in May of 1985. The UDR provides organisation and financial support for the landowner's resistance to land reform and to the threat posed by an increasingly organised peasantry.

Table 25: Number of workers killed in Pará due to land disputes (1977-1986)

1977	6	1982	20
1978	6	1983	30
1979	15	1984	29
1980	34	1985	59
1981	15	1986	71

Source: Movimento dos Trabalhadores Sem Terra (1987)

The regional plan for Pará was issued in 1986. The first stated goal of the PNRA for Pará was to reduce the major centres of conflicts over the occupation and uses of land (MIRAD, 1986a: p.9). The Pará plan focused on 122 areas that had been the sites of land conflicts. This plan pointed out Conceição do Araguaia, Xinguara, Redencão, and Marabá as priority areas due to high rates of social conflicts. As can be seen, rather than taxation or expropriation of latifundios the priority was to diminish social conflicts. The above is quite important in the analyses, because it shows once again how the central preoccupation in Pará has been dealing with the hot spots in the area, recognising the permanent social unrest in the area due to the land system. That is why many of the land purchases were done in the area known as "Brazil-nut polygon" in Pará, which traditionally has been a very volatile area. This confirms the current program of land reform. For instance, of the 1.6 million hectares that by December 1997 the government was able to use for allocating land, 447,000 hectares were in Pará and none in Roraima(*O Globo*, December 20, 1997). The above shows that the land reform priority is given to areas of intense land conflicts.

Nevertheless, this ambitious plan was not carried out with the *latifúndios* due to the fact that large landowners managed to introduce a proposal, which stated that no matter how large the property was the PNRA could not expropriate it as long as it was considered to be an on-going productive farm or officially classified as a rural enterprise. The use of the concepts of *non-productive* ownership and *productive* ownership introduced ambiguity in the definition of the land that was subject to expropriation through agrarian reform. This change reflects the power of the large owners organised in the UDR.

The above situation obviously exacerbated land and environmental problems in the Amazon and Pará, because landowners were eager to clear their properties of forest to prove that they were economically productive and therefore not eligible for expropriation.[139]

In spite of this, however, Pará was the state with the highest number of expropriations during the period between 1985-1989. According to INCRA (1990) a total of 57 expropriations were made equivalent to 887,985 hectares, allowing the resettlement of 14,421 people. It has been recognised that in many cases the expropriation done actually benefited the large land owners, because many expropriations can be paid out on land that they wanted to get rid of, and they saw the government offer as a good way of getting money for it.

The latest attempt at agrarian reform has been executed by the current administration of Fernando Henrique Cardoso, in a commission begun in August 1996. An interesting point is that the MST was incorporated into the discussion of the new land reform plan. For the classic

[139] For instance, in March 1997 the owner of the *Fazenda* Pastorisa, 15,000 hectares located in São Joâo do Araguaia, was accused by the MST of cutting down thousands of hectares of forest in few days in order to avoid the land being qualified as unproductive.

Amazon it was announced that around 25 million hectares were evaluated to be expropriated or bought. The goal was that by the end of the first administration of Fernando H. Cardoso (1999) land will have been allocated to 280,000 families, which would represent 25 % more than the total amount allocated since 1964.[140] According to data by SEJUP (November, 1997), after almost three years of government 104,000 families have been successfully settled.

The first problem the program faced was speculation in land prices. Thus, as I mentioned earlier during the 1960s and 1970s many ranches in Pará were sold for low values in order to bring economic development to the region, but now the ranches have been purchased back in order to settle landless families. It has been revealed that the government has been buying back land for a price that is several times higher than they received for it in the previous decades (*Folha do São Paulo*, November 16, 1997). The point is that since the introduction of the "plan real" in 1994 the market value of farmland has decreased. According to a survey carried out by the Centre of Agricultural Studies of the Getulio Vargas Foundation there has been a 50 % decrease in land value since the Plan Real, a situation explained by the relative economic stability and the high interest rates. Because of this the use of land as an investment dropped, and land is now seen as suitable for production. Other reasons are the landowners' fear of land invasion now that the *movemento sem-terra* has strong organisation and support, and also the fact that the interest of speculators have moved from land to financial investments which are more profitable (SEJUP, 1997).

7.6.1.6 Actors in land conflicts.

The above section showed the prominent role of the state as an actor in the land-issue, while at the same time the military was presented as core institution in the execution of state land policy. In this section I attempt to present the most important feature of other actors involved in land conflicts in Pará. An important generalisation that can be made is that most of the actors form well-organised groups. In fact, some actors such as the Catholic Church, the Movement of the Land-less Rural Workers (MST), the Democratic Rural Union (UDR), and the state work as real organisations. The web of actors in land conflicts also includes others such as *grileiros* and *posseiros*.

a. The Catholic Church. First voice of the landless

The violence affecting *posseiros* and landless people in Brazil moved the bishops of Brazil to organise the Pastoral Land Commission (CPT) in 1975. What was happening to the Indian population and the peasants in the Amazon became the great social reference point in the application of the Church's social doctrine.[141] This reformulation appears in Catholic attitudes from 1973 onwards and culminates in the assembly of the National Conference of Brazilian Bishops at the beginning of 1980, with the document "Church and land problems" (Martins, 1995: pp.148-149).

The development of the Catholic Church's strong position on the land issue made the government accept the church as a mediator group. As indicated by Martins (1992), it is possible to see a change in the government's position in a speech that General Golbery do Couto e Silva made to the *Escola Superior de Guerra* to justify the beginning of the so-called

[140] The estimations done by the government of Fernando H. Cardoso were: 40,000 in 1995; 60,000 in 1996; 80,000 in 1997; and 100,000 in 1998.

[141] In this way the Catholic Church in 1973 decided to organise the Indigenous Missionary Council (CIMI) in order to promote a wide reformulation of pastoral work among the indigenous population and to radically modify the mission of conversion that had characterised the missionary activity.

political opening. In this speech he referred explicitly to the fact that the church was being transformed into an instrument of expression for social demands.

In southern Pará, the above situation was quite clear. There the Pastoral Land Commission supported *posseiros* against large landowners, so with the support from the CPT, *posseiros* began to invade the Brazil nut lands (*Poligono dos castanhais)* in the 1970s and 1980s. The problem was aggravated by the fact that, as I have mentioned, these lands did have a peculiar legal status because they were neither private nor public due to the *aforamento* system. With this ambiguity in land ownership the surrounding of the town of Marabá became the site of intense and often violent confrontation. Moreover, the church played a crucial role in Pará defending small farmers whose lands were threatened by ranchers and speculators drawn to southern Pará by SUDAM's fiscal incentives. Thus, the church encouraged grassroots organisations to grow in the 1970s. In recent years the Catholic Church has been one of the most important supporters of the landless in Pará. That can be seen in the direct involvement of several priests in the MST, as well as in official statements by Church members supporting activities carried out by the MST. For instance, during 1997-98 the MST was using the occupation of public offices as a strategy. Thus, in March 1998 the Bishop of Fortaleza Claudio Hummes declared that the MST has the right to occupy such places.(*Estado do Sõo Paulo,* March 29, 1998).

All this intervention has caused persecution of priests as well as murder. For instance, in May 1986 in Imperatriz, Pará the priest Jósimo Tavares was shot in the back on the steps of the Church Land Commission of which he was the co-ordinator. His murder was allegedly ordered by a local landowner (Hall, 1991: p.82). The discourse of the church matched the situation of land concentration and social gaps in Pará. It was clear that Pará presented a clear dichotomy: on one hand, there were several landowners in the state with enormous tracts of land that they could not take care of, and on the other hand, many landless people were struggling for survival. In that sense the alliance between peasant communities and the progressive branch of the Catholic Church was inevitable.

b. Movement of the Landless Rural Workers (MST)

Although the phenomenon of organised peasant communities in Pará is not as strong as in the south of Brazil, there has recently been an enormous increase in their participation in land disputes through the MST. The MST was born out of the progressive church, having as its major allies the Catholic Church and the Worker's party (PT). Its major guiding principle, set out in 1984, is that land should belong to those that work it in order to support peasant farmers and their families (MST, 1986). It is important to mention that even though the peasantry made up one-third of the population in Brazil, which means a strong electoral base, they have been excluded from effective representation in the party-system. That can be seen in the fact that by 1998 the MST has only one member in the federal parliament, and that is Adão Pretto (PT-RS), the founder of the movement. This number stands in contrast with the 140 members of the so-called *bancada ruralista* grouping large landowners of the Amazon and linked to the UDR (*O Globo,* May 03, 1998). However, the MST is currently recognised as the most important popular movement and in the national elections of 1998 they presented several candidates to be nominated to the Parliament through the Workers Party (PT). Its public recognition as an important organisation can be seen in the fact that the government has been continuously negotiating with them on all the aspects related to land reforms.

The MST is a quite well-organised group made up of Brazil's dispossessed, basically casual pickers, farm labourers, and people thrown off the land by mechanisation, land

concentration, and land clearances.[142] According to a poll done in 1997 this is the largest popular movement in Brazil with 220,000 members getting the support from up to 90 % of the Brazilian population (*Guardian Weekly*, November 05, 1997). Their strategy is based on the targeted occupation of under-utilised estate lands. However, according to a new opinion poll carried out in March 1998 by the Instituto Brasileiro de Opinão Pública (Ibope), the majority of the Brazilian population does not support land invasions in productive land. The poll also shows that even though 80 % of the population support an agrarian reform, 59 % are against land invasion of productive land no matter what the size (*Estado do São Paulo*, June 4, 1998).

Even though the MST was established in the south of Brazil, lately they have been very active in southern Pará, which can be noted in the violence that has been generated as a result of its land occupations. On April 17, 1966, for instance, 19 landless people were murdered in El Dorado de Carajás. This occurred when a demonstration of 2,000 landless people were occupying the *Fazenda* Macaxeira in the municipality of Curianapolis were shot at by the military police, an episode apparently planned and financed by local landowners with the aim to prevent the continuation of the activities of the MST (*O Globo*, April 20, 1996). In the same, way the founder of the MST in Pará (Onlício Araújo) was killed, apparently by f*azendeiros*, in March 1998 in Parauapebas, Pará. He was killed after an assembly where it was decided to invade the *Fazenda* Goiás II in Pará.

c. Grileiros

Finally, I mention the *grileiros* here due to their significant influence on the dynamics of current social conflicts in Pará. Today the situation is even more complicated due to the growing pressure for land and the incapacity of the government to accelerate the agrarian reform. In that sense some of the land invasions are occurring outside the organisation MST. This has been evident in Pará, where many invasions are being organised by *grileiros*, who take the land in a violent manner with the sole objective of selling it afterwards. Concrete recent examples are the invasions of the *Fazenda* Volta do Rio and Inaja in El Dorado de Carajás and Santa María das Barreiras. Thus, conflicts are taking place between s*em terra* and *grileiros*, as well as between *grileiros* and large land owners. In the latter case this *grilagem*, which is not new in the Amazon, is creating a lot of conflicts in regions such as Araguaia, because the ranchers are hiring gunmen with the specific aim of expelling the *grileiros*.[143]

Moreover, it is important to note how the *grileiro* is an actor causing high stress in the system, because they usually take private or public land by violent means, and sell it as soon as possible at very low prices in order to move on. This situation generates a complex web of social stress between *grileiros*, landowners, and state institutions. For instance, the *Fazenda* Bamerindus located in El Dorado dos Carajás (PA) was occupied in 1997 by 600 people organised by INCRA in order to avoid invasion by *grileiros*. Thus, in the near future more conflicts could be expected between *grileiros* and the MST, considering that many people belonging to the MST are becoming landowners.

7.6.1.7 Pará as the leading state of land conflicts. Evaluating the scenario

[142] This can be seen in the fact that they have their own administrative structure, a headquarters in São Paulo and a newsletter with a circulation of 30,000 copies.

[143] A recent example of *grilagen* has taken place in the *fazendas* Baguá and Volta do Rio where both of them were occupied by *grileiros*. This finished with a police intervention in August of 1997. One could find many examples like this in Pará.

Considering the data provided by the Pastoral Land Commission (see table 26 and graph 9) it is possible to conclude that Para is clearly the state of the classic Amazon with the highest intensity of land conflicts. The differences that are shown in graph 9 confirm such a statement.[144] However, the data I will display has to be counterbalanced with the variable of population due to the fact that Pará is the Amazonian state with the largest population. These relative numbers are presented in the next chapter (chapter VIII). Nevertheless, seen from a comparative level, by 1996 Pará had double the population of states such as Amazonas and Rondônia. However, looking at the data one sees that the number of casualties has not just doubled, but is even much higher than that.[145] Moreover, it is important to note that the data in tables 28 & 29 show that the number of victims in the last 20 years has been significant as well as constant over an extended period. A real escalation of violence in terms of assassinations is not perceived, but the numbers remain constant. The only exceptions are the years 1985-86 and 1996. Nevertheless, the high number is explained by very concrete reasons. In the case of 1985-86 it could be partially attributed to the announcement of the new agrarian reform plan, and in 1996 to the massacre of 19 people belonging to the MST in El Dorado do Carajás.

It is important to note that most of the casualties occurred in southern Pará. In this sense the places of most intense land conflicts in Pará have been: Marabá, Xinguara, Conceição do Araguaira, São Félix do Xingú, El Dorado do Carajás, São João do Araguaia, Paragominas, Parauapebas, Rio Maria, Curionópolis and Tailândia.

The fact of this large number of casualties in Pará in comparison with other states, and the fact that most of them are located in southern Pará could in the first instance be explained by the conceptualisation of Pará in the 1960s and 1970s as a resource frontier as well as an empty space. The above is conceivable because Pará is the clearest example of large-scale commercial penetration and exploitation in the Amazon. I have previously pointed out how Pará got most of the SUDAM incentives as an example. The frontier dynamics encouraged large landowners as well as large enterprises to invest in Pará. At the same time the government also promoted land-hungry peasants expelled from north-eastern and southern Brazil to settle in the frontier as a solution to the problem of poverty and land concentration in the rest of Brazil.

Table 26: Number of casualties in land conflicts in Pará (1988-97)

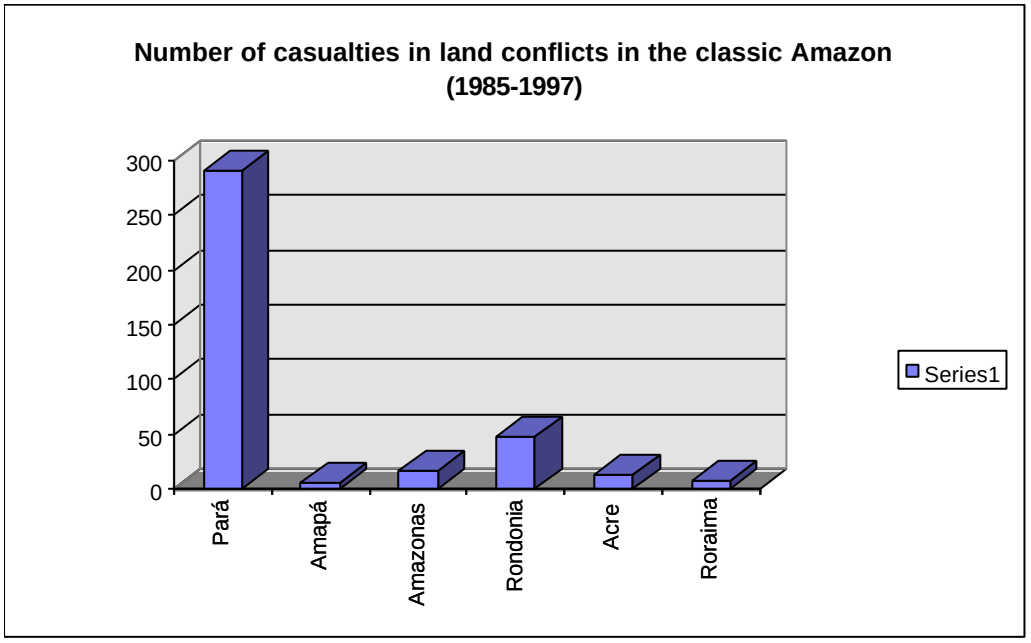
1988	20	1993	21
1889	12	1994	13
1990	20	1995	14
1991	16	1996	33
1992	15	1997	11

Source: CPT (1998)

[144] The numbers according to the CPT are the following: Pará (291), Amapá (5), Amazonas (16), Rondonia (48), Acre (13), and Roraima (8).

[145] The population of Pará in 1996 was 5,510,849, while Amazonas and Rondónia accounted for 2,389,279 and 1,229,306 respectively.

Graph 9: Number of casualties in land conflicts in the classic Amazon (1985-97)



Source: CPT (1998)

Another important aspect that can be inferred from the above data is that the continuously high number of casualties over an extended period shows that the actors have been unable to resolve problems of land access and ownership within the existing institutional framework. The reason could be found in the structure of the Brazilian political system that has been explained in the previous chapters.

Everything that has been mentioned in this section shows that the complexity of land conflicts in Pará has become greater since the 1970s, due to the involvement of new actors like the Catholic Church, the MST, the organisation of the *fazendeiros* in the UDR, and the military. Moreover, the situation is further complicated by the fact that the parties have become more entrenched in their positions, as in the case of the landless that are now organised as the MST, and the large landowners represented by the UDR.

7.6.2 The mining economy in Pará. Conflict and negotiation

Parallel to land conflicts, Pará has experienced the development of social conflicts as a result of mining exploitation. I have previously mentioned the important role of frontier dynamics as a starting point for explaining development in Pará. The mining sector provides a good example of how large-scale commercial penetration and exploitation in Pará has worked. A case in point is the Greater Carajás Program (PGC). It is important to understand that mining in the Amazon and Pará is not a recent phenomenon. What is new, and consequently important, in terms of partially explaining the dynamics of these conflicts is the large-scale penetration of mining through joint-ventures between state enterprises and foreign capital enterprises, along with the conflicts generated with *garimpeiros.*

The growth of the mining activities in Pará has not been constant. On the contrary even though this activity has been the driving force of the Paraense economy, it has recently experienced some fluctuations The first boom was experienced in 1979 with the exploitation of bauxite by ALUNORTE in Trombetas in north-western Pará, and the second important moment was in 1983 with the production of gold in Serra Pelada, and finally after 1986 with the complete operation of the PGC.

Before starting to unravel the contribution of mining to social conflicts in Pará, I would like to make three observations. In the first place, the mining economy in Pará is driven both by corporate activities as well as by the informal sector or *garimpeiros.* Secondly, the conflicts are not only understood in terms of consensual conflicts, but also in terms of dissensual ones. I will illustrate this through the negotiations between *garimpeiros* and the Kayapó Indians. Finally, though mineral conflicts in Pará have reached in many cases the manifest stage, the intensity is far lower than in the land-issue.

7.6.2.1 Conflicts between the mechanisation of Serra Pelada and the economy of the "Barranco"

The discovery of gold in southern Pará in 1979 introduced a new entropy factor in this state. The most turbulent place was Serra Pelada. Located in the Araguaia-Tocantins area in southern Pará, this has been the richest gold discovery in Amazonian history, as well as the most visible example of the gold rush in the Amazon. Serra Pelada is an interesting case because it was the first *garimpo* that was taken over by the state.

Since 1974 the CVRD laid some legal claim to the area of Serra Pelada. The argumentation by companies such as CVRD, CPRM and DOCEGEO has been that *garimpeiros* were technically incapable of extracting gold efficiently at the depth which the main pit in Serra Pelada had reached. Another participant in the controversies was *the Instituto Brasileiro de Mineracão* (IBRAM), an association representing both public and private sector mineral companies in Brazil. For IBRAM Serra Pelada was a dangerous precedent. The problem was that the concession made by the government seemed to show that the state was institutionalising *garimpagen*. For the formal mining sector this case was important because it tested the influence that *garimpeiros* could have in the future on legislation and rights to exploitation in general. IBRAM put the issue in the following terms:

What we stand for is the idea that the development of Brazil should be carried out in an orderly fashion, regulated by due process of law, and that in the case of mineral legislation the guiding principle must be economically rationality, and not social or political expediency […] Investor can not feel secure, because in mining what guarantees investment is the security afforded by the permanence of basic legislation. It was this principle which the episode of Serra Pelada contravened (Cleary, 1990: pp.181-182).

What we stand for is the idea that the development of Brazil should be carried out in an orderly fashion, regulated by due process of law, and that in the case of mineral legislation the guiding principle must be economically rationality, and not social or political expediency […] Investor can not feel secure, because in mining what guarantees investment is the security afforded by the permanence of basic legislation. It was this principle which the episode of Serra Pelada contravened (Cleary, 1990: pp.181-182).

The *Departamento Nacional de Pesquisa Mineral* (DNPM) was detailed in March 1983 to produce a scheme for the mechanisation of mining in Serra Pelada. It suggested an investment of 25.5 million dollars, envisaging a monthly production of 770 kilograms of gold, and projecting the labour force required as a mere 340 workers and supervisors (Cleary, 1990: p.180). The CVRD also argued that the construction work that the investment needed to make Serra Pelada a safe place for *garimpagen* was greater than the investment that CVRD believed necessary to mechanise production once the *garimpeiros* had left. The pressure and argumentation made president Figueredo hand Serra Pelada over to the CVRD in June 1983, transferring the *garimpeiros* to Cumarú and Tapajós.

The closing of Serra Pelada to *garimpeiros* provoked a violent reaction. In June 1984 the situation was very tense, and several thousand *garimpeiros* blocked the Belém-Brasilia highway, destroying the telecommunications system of the police in Serra Pelada, and burnt down the CVRD building. After these incidences President Figueredo signed a Curió-sponsored bill that reopened Serra Pelada and turned the gold field over to a miner co-

operative.[146] *What was the importance of this event?* Clearly the most important consequence is that for the first time in the Amazon history the *garimpeiros* were able to confront the formal sector and the state on its own terms within the political apparatus.

Why did the government finally leave Serra Pelada open to garimpeiros? There are several answers to this question. First of all, this issue was causing serious political damage to the government at a time when a new election was about to be held in 1985. Secondly, the *garimpo* offered a solution to some intractable problems for the government like the unemployment of a large mass of people in the north-east and the big cities such as São Paulo and Rio de Janeiro. Thirdly, the area was already suffering from several conflicts, so it was not advisable to add one more cause of conflict to this volatile area. Finally, it should be mentioned that the position of Curió was fundamental because he was a bridge between the government and the *garimpeiros*. On both sides Curió got open access to formulate his petitions. All these elements explain why the economic considerations in this particular case were put to one side, even when studies showed that it was more rational to hand the *garimpo* over to CVRD, as the formal mining sector had wished..

The conflict between *garimpeiros* and the CVRD is not over. Thus, after the privatisation of the company in 1996 many more conflicts have been detected. The primary new factor of conflict has been the 1966 discovery of Serra Leste, a new area of gold very close to the main location of Serra Pelada. Thus, in May 1998 close to 200 *garimpeiros* invaded the area, which then provoked the reaction of the CVRD and caused military intervention.

7.6.2.2 Greater Carajás Programme: Toward a new frontier phase

Located in the south of Pará, Carajás is the richest mineral province of the world. Surveys have revealed that Carajás has the largest known high-grade iron-ore reserves in the world (Silveira, 1993: p.138 & Hall, 1991: p.43). This province became the centre of the Greater Carajás Programme (PGC). Located in the north of the parallel 8 with the rivers Araguaia, Xingú and Paranaíba as borders, the area covered by the Carajás program represents 10 % of the Brazilian territory, and includes parts of the states of Pará, Tocantins (before Goias), and Maranhão. It covers a total of 900,000 square kilometres, more than twice the size of Sweden.

The backbone of the Carajás programme is formed by four major projects: An iron-ore mine, two aluminium plants at Barcarena near Belém and in São Luís, and the Tucuruí hydroelectric scheme on the river Tocantins. The cornerstone of the programme was the iron ore mine. However, the programme also embraces industries such as livestock, lumbering and commercial agriculture. The *Serra do Carajás* also contains, copper, nickel, cassiterite, gold and sixty-five million tones of manganese, used in the production of batteries and iron alloys (Hall, 1991 & CVRD, 1986).

It is important to make a distinction between the Greater Carajás Programme (PGC) and the Carajás-Iron Project (PFC). The PGC was conceived to include several activities such as mining, agriculture and livestock and some lumbering while the PFC was basically an iron-ore production project. Moreover, plans for the Carajás Iron-Ore Project were already under way by the time the Greater Carajás Programme was launched in 1980, using the former project as its basis.

According to Silveira (1994), the Carajás Iron-Ore Project has a strong effect on the spatial configuration of the region and the dynamic of conflict. Thus, with the project in the region

[146] Curió was the leading figure in the dispute. In fact, Curió who had been elected by the *garimpo* votes supported them in their fight to overturn the veto of president Figueredo and open Serra Pelada to *garimpeiros.* His influence was recognised by the government when he was sent to Serra Pelada to negotiate with the *garimpeiros.*

land values went up considerably, which soon closed the agrarian frontier for many landless migrants, and implied losses for large segments of the local population, especially farmers and groups dedicated to extraction activities. Competition between Indian groups, small farmers, nut collectors and large enterprises increased and has been the cause of many conflicts. It should be remembered that Brazil has 11 % of world's iron-ore reserves and is the second largest producer in the world, after the former Soviet Union (Silveira: 1994, pp.149-51).

The PGC was created by the CVRD, by then a state-owned enterprise, but privatised in 1996, which is the largest world exporter of iron.[147] Even though the rich deposits of iron-ore were discovered in 1967, the program was formally established in November 1980 via Executive act No.1,183. The work started in 1982, and the exportation began to take place in 1985 (Becker, 1991: p.71). The project was totally supported by the government, and the decree Law 1,825 of December 1980 instituted the fundamental taxes and financial incentives for investors in the PGC.

Incentives include the exemption from payment of income taxes to investors who channelled those funds into projects approved by the PGC council.[148] This provision embraced not just those companies making investments into industrial or manufacturing plants, but also the construction companies from the south undertaking building and infrastructural work. The period covered by these concessions was extended in 1984 until 1990, however they were reduced to fifty % by 1985. Other incentives included exemptions from tax payments on manufactured goods and import duties on foreign machinery and equipment, the priority being on the allocation of bank funds, and low electricity prices (Hall, 1991: pp.47-48). This all indicates that in the Carajás project the variable allocation played an essential role.

It is clear that the Carajás Iron-Ore Project was conceived as an economic corridor linking the local economy to the national and international economies, very much in the line with the frontier theory. Aside from mineral development, one of the most visible results of the structure of incentives mentioned above was the increase of establishments dedicated to cattle ranching. According to Silveira (1994), between 1975 and 1985 in the municipality of Marabá the number went up by almost a thousand times. Livestock expanded until it occupied half of the rural land, as opposed to the 22 % that it occupied by 1975. However, in Marabá for example, this activity was not basically at the expense of agriculture (as in other areas), but of extractive activities. Nevertheless, it is important to keep in mind that in many cases the formation of pasture was used only as a means of effective occupation.

7.6.2.3 Some outcomes of the project

The most visible consequence of the PGC is the complete transformation of the social dynamics in the area and the increase in deforestation. The development of infrastructure including roads, railroad, and a harbour has had a major influence in the transformation of the social dynamics by allowing rapid occupation of the region. In addition, it is clear that this infrastructure contributes to the frontier dynamic by assimilating new regions into the new socio-economic dynamic. The size of this project is such that its impacts go beyond the

[147] Brazil is the second largest producer of iron in the world only behind the former Soviet Union, and it has 11 % of the world's iron reserves. Half of its production is exported. Iron accounted for 8 % of the total Brazilian export.

[148] The council includes eleven ministers, the head of the national Security Council, and the governors of Pará, Maranhão and Tocantins. The minister of planning heads this.

project's immediate area, fostering huge movement of people and provoking large environmental damage.

The program has been also a magnet for job-seekers, a situation which has transformed small villages into real towns, as in the cases of Marabá and Açailandia. When it comes to deforestation, the fiscal incentives for melting the iron and for agricultural projects are visible, especially if one takes into account the great amount of charcoal used in the melting process. The CVRD (1987) calculated the annual removal of forest at 29,000 hectares. An additional problem is relying on charcoal produced from native forests, having displaced local population living on forest products. In table 27 one can see how Pará has become the most important producer of charcoal in the Amazon, and more importantly, after the installation of the PGC its contribution has grown a significant rate. Nevertheless, as Silveira (1993) has noted, this increment in Pará cannot be directly related to the area included in the PGC, because places such as Marabá, and São João da Araguaia were responsible for only a small percentage of the whole production of the state.

Table 27: Charcoal Production in Pará in thousand tons and the equivalent percentage for the classic Amazon

	1975	1980	1985	1989
Pará	13.8	20.4	25.4	75.8
Classic Amazonia	54.2	66.0	60.0	93.0

Source: IBGE. Produção extrativa vegetal 1975,1980,1985, and IBGE Produção extrativa vegetal e da silvicultura 1989. Taken from Silveira 1994.

The expansion of logging activities and charcoal production in Pará (see tables 18 & 29) have severely reduced traditional activities in this area. For instance, in Pará between 1975 and 1989 the production of Brazil-nuts and Babassu-nuts decreased enormously (see tables 30 & 31). The above has had serious consequences for the local population, displacing them and changing the social dynamics of the area, therefore creating two different socio-economic structures. In summary, I would say that in this context one could see how private and public national interests were thus pressed at the expense of unarticulated interests of local people and migrants.

Table 28: Production of Brazil Nuts in tons in the state of Pará (1975-1989)

State	1975	1980	1985	1989
Pará	20,667	22,611	15,417	8,465

Source: IBGE. Produção Extrativa Vegetal 1975, 1980, 1985. IBGE Produção da Extração vegetal e da silvicultura 1989. Cited by Silverira (1994).

Table 29: Production of Babassu-nuts in tons in the state of Pará (1975-1989)

State	1975	1980	1985	1989
Pará	1,227	114	47	42

Source: IBGE. Produção Extrativa 1975, 1980, 1985. IBGE Produção da Extração vegetal e da silvicultura 1989. Cited by Silveira (1994).

7.6.2.4 Conflict dynamics along the PGC

The development of the Carajás programme has generated great social unrest. Some of these elements are the attraction to an area that has a new set of social actors and the development of a totally new infrastructure. According to Cleary (1991), most concern has centred around the fate of the estimated 40,000 people displaced by separate projects, the integrity of Indian reserves within the PGC area, and the environmental consequences. In addition, the agricultural programs and the poverty of the soil also contribute to social unrest. For instance, in the case of soil, Furley (1990) has revealed that over 90 % of the soil has low fertility Oxisols and Utisols, which imposes serious limitations to the practice of permanent agriculture. It has been observed how critical this is in the Amazon, above all in the *terra firme* system, where only 10 % is fertile, but in Pará this is even lower, being around 3 %.

A large project such as PGC has the tendency to pressure peasant agriculture, which erodes the ability of small farmers to provide their own subsistence, as well as eliminates the possibility of additional income that generates more insecurity. This situation is complemented by the expulsion of small farmers from frontier to frontier, therefore producing settlement instability and the chances of conflicts consequently grow. The social cost is illustrated below in table 30.

Table 30: Murders in the PGC area associated to land and mineral disputes (1985-87)

Numbers of the incidents	**Main locations of the incidents**
35 peasants shot by gunmen	Xinguara, Santa Luiza and Araguaia area
23 Gunmen killed	Xinguara and Araguaia area
18 Rural worker shot by gunmen	Paragominas, Marabá, and Araguaia area
2 Military police killed	S. Joâo do Araguaia
1 priest shot	Marabá

Source: Data taken from Hall (1991, pp 83-84)

As can be noted from table 30 there has been a high number of violent incidences since the PGC began. This means that open conflicts were constant during these years. Even though I have not data for the same area in previous years the numbers of violent incidence for the whole state of Pará shows that open conflicts around this area were exacerbated after the implementation of the PGC.

As a general conclusion it can be said that the extension of the frontier not only produced land conflicts, but in addition, as previously illustrated, conflicts on the appropriation and ways of utilisation of the mineral resources held by the state of Pará. As I have mentioned, in most cases the type of conflicts are consensual, with very few elements of a dissensual nature. The variables of allocation, environmental change, and the general exclusion of large sectors of population of the Brazilian society have been the most relevant in influencing the conflicts related to mining activities. The above variables have in a way reinforced each other. As such,

the allocation of resources for developing projects, such as the way Carajas has been a magnet for destitute people living in other areas of Brazil. At the same time the charcoal production has contributed to deforestation, which consequently has affected the daily life of the forest dwellers. As a result, the new situation places several social actors in a precarious situation.

7.6.3 Conflict over Indian lands

Pará represents an interesting case when it comes to conflicts concerning the utilisation of Indian lands. If this situation is compared with the experience of the Indians in Roraima described in the previous chapter, one finds some similarities, but basically some great differences in the development of the social conflicts. As I will show Indians in Pará have been much more involved in negotiation and resistance movements with other social groups than Indians from Roraima.

Generally, the conflicts fall in the category of consensual, but also dissensual. However, contrary to land and mineral conflicts that were primarily consensual, the conflicts over Indian lands have not been strictly related to ownership, but to disagreement on rights and norms on the exploitation of some resources within the Indian land. Examples of this are the conflicts on mining (garimpos Tarzan and Maria Bonita) and logging in the Xicrin Cateté area.

7.6.3.1 The Xingú complex. First successful resistance movement

The first important resistance movement by the indigenous population in Pará took place as a result of the potential socio-environmental impacts of the tentative construction of several dams along the Xingú River. Inventories of the Xingú dams complex were conducted between 1975 and 1980, where six sites were chosen for maximum generating potential from the water resources in the region (Cummings, 1990: p.66), five of which were along the Xingú river, one of the major tributaries of the Amazon. The Indians' opposition to this project has been one of the most successful in the Amazon history.

In February 1989 a large gathering of Indian people, including the Kayapó as well as Indians from other tribes, demonstrated against the complex in Altamira. Thus, they decided to build a village alongside the complex in order to stop the construction or at least to get the government into negotiation. A week later the occupation was finished after negotiating with ELECTRONORTE. This success placed the Kayapó Indians as a real political force influencing development in the area.[149]

It is important to remember that the history of Indian resistance in Brazil has been weak due to the conditions of isolation and lack of representation that have made social action difficult. In many ways the Catholic Church has been the main institution warning the public about the threats faced by the Indian population. That is why the Kayapó example is remarkable.

Thus, *How can one explain the Kayapó's success in getting their demands recognised?* The Kayapó have a long history of fighting against other social groups to keep them off their land. Thus, since the beginning of the century battles were fought between settlers and the Kayapó, and in addition the rubber boom brought new problems to the area with the arrival of rubber tapers at the end of the XIX century and the beginning of the XX. The situation was repeated in the 1940s when there was a short revival of the demand for natural latex as a

[149] It should be said that the Kayapó influence was helped by the use of mass-media, for instance the publication of *"O Kayapó"* in 1987, which became an instrument of the Indian people. In addition, they were well organised and used short-wave radios to notify each other on the incursion into their lands. Finally, they received plenty of international attention, which is evident in the fact that they were invited to a conference on the management of the tropical rainforest in Miami.

result of the Second World War. With the decline of the rubber trade, other activities came onto the scene and with them another set of social actors. By 1930, the gathering of Brazil nuts along the region was intensified, a situation that brought the Kayapó into contact with the *castanheiros*. Finally, the missionaries have always been present in the region, especially after 1930. This tradition of contact with settlers and outsiders partially explains the ability of the Kayapó to negotiate with *garimpeiros*, the government, and loggers during the 1970s, 1980s and the present.

7.6.3.2 Land invasion: The recurrent problem

The Amazon tradition of encroachment upon Indian territories continues in Pará. Data provided by D. Treece (1987) show that by 1987 a series of invasions and violations of Indian lands took place in the PGC, among them: invasion by cattle ranchers (Cateté reserve, Xicrin-Kayapó tribes, and the Alto Rio Guama reserve, Tembe, Guajá, and Urubú tribes); official colonisation by GETAT (Mâe Maria reserve, Gaviões tribe), and incursion by landless farmers (Apinayé reserve). The infrastructure developed in the region also had repercussions on the use of Indian lands. Some examples are the impact of the BR-222 highway from Açailândia to São Luis, the Carajás railway on the territories of Rio Pindaré and the Gaviões of Mãe Maria; and also the trespassing by logging companies and mining enterprises in Suruí and Guajá in the reserve of Awa-Gurupí (Treece, 1987: pp.47-57).

The manifest stage of conflict due to land invasion took place in 1980 when the Kayapó asked FUNAI to stop the new clearing taking place inside the reserve. When the land invasion continued a group of Goritore Kayapó took matters into their own hands, and killed twenty people (Schmink & Wood 1992: p.262). The event drew national attention to the conflicts underway, and in the Kayapó territory local ranchers armed their employees and threatened to kill Indians on sight. This situation did not contribute to reducing the problem, but on the contrary, as Schminck and Wood (1992) pointed out, the Kayapó land was increasingly invaded by ranchers, loggers, and miners. This situation united sixteen Kayapó leaders in 1981. Although there were sharp differences among Kayapó chiefs regarding other issues, namely the presence of loggers and miners on Indian lands, all agreed on the urgency of securing demarcation.[150]

Finally, it should be said that conflicts on Indian lands have not only taken place between Indians, loggers, and *garimpeiros*, but also between *colonos* and Indians. In fact, one example is the conflict between the Gavião and *colonos*. In 1987 the Gavião blocked the Carajás railroad to protest against the occupation of their lands by *colonos*. These *colonos* were essentially placed there by GETAT.

7.6.3.3 Gold and Indian lands

Indian groups in Pará are not isolated at all, but on the contrary, as we have seen in the case of the Kayapó, they participate openly in the regional and national economy. When it comes to gold mining on Indian lands in Pará the Kayapó adopted a different strategy than was used in other areas of the Brazilian Amazon. Instead of direct confrontation some of them decided to negotiate with *garimpeiros* for the access and utilisation of their land. Nevertheless, they were divided over the best way to deal with the presence of the *garimpeiros*. Some favoured doing business with them, but others wanted nothing to do with them.

[150] The differences can be seen in the fact that while a Kayapó chief negotiated contracts with loggers, some members of the Aukre village attacked and killed three men in 1987 found carrying out illegal logging in their land.

The development negotiations between the Kayapó and *garimpeiros* is like a two-sided coin. Based on information provided by Schmink and Wood (1992), I will describe the contrasting cases of Rio Branco and Cumaru. The first took place around Rio Branco in the late 1970s, where two sections of Kayapó territory (north-east corner of the reserve, and Gorotire) were invaded by gold miners. For a while *garimpeiros* were working without problems in the Rio Branco area, basically due to the remote distance from the village of Krikretum. However, by 1980 Chief Pombo (founder of the village) led some warriors to Rio Branco to expel the *garimpeiros*. Pombo managed to do it with FUNAI assistance. Nevertheless, in December 1980 a company called Stannun appeared with a research permit to reopen the Rio Branco *garimpo.*

The attempt to mine Indian lands proved controversial, prompting a special interministerial directive issued in January 1981 that would limit such activities to state mining companies. Based on this directive, FUNAI refused permission to Stannum. However, due to the gold rush in southern Pará, Pombo decided to negotiate with Stannum, so in April 1982 he signed a contract with the company giving it exclusive rights to work in the area for a three year period, using up to four hundred men. The company agreed to pay Pombo 5 %of the production from mechanised mining and 10 % of the gold extracted through *garimpagen*. Nevertheless, FUNAI as well as other Kayapó chiefs opposed the agreement with the company, and the two thousand *garimpeiros* who stayed were obliged to pay a 10 % fee to the Indians (Schmink & Wood 1992: pp.266, 267).

The second episode of dispute concerning negotiation and royalties took place in Cumaru during the 1980s, when gold was discovered very close to the village of Gorotire. The difference with Rio Branco was that this area was controlled by the military, so the Indians were unable to negotiate openly with *garimpeiros* regarding the exploitation of the Tarzan and Maria Bonita gold sites. As Schmink & Wood (1992) noted, the Kayapó received only the amount legally due to the owner of gold bearing land or 1 % of the mining tax.

It is interesting to see that it was the unstable situation in these areas and the Kayapó's willingness to negotiate that soon will lead to demarcation of their land. The first step taken by the Kayapó was to take over the *garimpo*. Thus, in 1985 the chiefs of the Gorotire (Kanhonk, Totoi and Paiakan) managed to suspend all the *garimpo* work, demanding the demarcation of their land as well as an increase in fees for future production. So, chief Paiakan went to Brasilia to negotiate a solution to the impasse, insisting that they would reopen the *garimpo* only after the land question was settled.

The above situation lead to an important victory for the Kayapó. On May 3, 1985, the Kayapó agreed to reopen the Maria Bonita *garimpo* as a result of an agreement with an interministerial working group that established the demarcation of the Gorotire and six other indigenous areas. In addition, they were to receive payment of 5 % of the profits from the mining area. Paiakan, the minister of the interior and agrarian reform and development, signed the agreement. In conclusion, through securing property rights the Kayapó assured an income for activities carried out within their reserve.[151]

After the agreement the Kayapó closely monitored the events. Basically, they decided to control the boats passing through their territory. Without any doubt the Kayapó are the most successful Indians controlling mining in the Amazon. However, a different situation occurred with the Yanomani in Roraima.

Even though this can be claimed as a Kayapó victory, it is important to say that the environmental problems caused by *garimpo* activities were visible in the Cumaru *garimpo*.

[151] For better or for worse the wealth they earned set them apart from other groups. In 1985, the Kayapó purchased their own aircraft and hired a pilot to carry them between villages, also for regular shopping in the closest towns and to patrol the reserve's borders.

There the pollution of the rivers Arraias, Ponte and Fresco caused serious problems to the Kayapó, affecting above all their fishing activities and causing the spread of malaria. For instance, according to the state health secretary, in 1986 the Maria Bonita *garimpo* accounted for half of all the cases of malaria in the state of Pará.

In short, although Rio Branco and Cumaru are different stories they have in common the fact that both of them led to the settlement of the delimitation of Kayapó land. In other words, the dispute with the *garimpeiros* was the main factor that helped the Kayapó to assure property rights on their lands.

7.6.3.4 Logging trade: conflict and negotiation

The second sphere of conflict in which dissensual conflicts could be perceived is in logging activities. In this case, several Indian tribes in Pará have lately been involved in conflicts on the commercialisation of timber products from their reserves. The cases of the Xicrin and Kayapó Indians are the most well-known.

In the case of the Kayapó it has been reported how these Indians have dealt with timber merchants in Pará in order to illegally extract mahogany (*Mogno*) from the reserve. It should be remembered that mahogany is of high value on the national and international markets. However, due to its rapid extinction the government of Fernando H. Cardoso declared in 1997 a moratorium on the exploitation of this tree. Thus, in August 1998 it was discovered how the Kayapó through the chief Paulinho Paiacãn were helping *madereiros* to extract mahogany illegally from the Makranotire reserve. According to a publication by the newspaper *O Liberal* (November 10, 1998), each Indian received US$ 50 for allowing the cutting down of trees.[152] The same publication estimates that illegal logging of mahogany totals US$ 300,000,000 annually.

The other interesting case of logging conflict and negotiation involves the Xicrin Indians. In March 1998 around 200 Indians from this tribe decided to block the road linking Parauapebas to Serra dos Carajás in order to force negotiation with FUNAI on the exploitation of timber and Castanha within the reserve. The Xicrin area of 1,000,000 hectares has been faced with the illegal logging of mahogany. FUNAI estimates say that around 60 indigenous lands in Brazil are confronted with pressure for illegal logging from timber merchants. As a result of the Xicrin pressure, an agreement was reached with FUNAI. Thus, they are allowed to exploit around 15 different types of woods. What is more important, the Indians are going to receive training in the sustainable management of the forest through the Instituto Sócio-Ambiental (ISA). The activities are going to be financed by resources from the World Bank and CVRD, and the timber production from the reserve will be exported to the Netherlands (*O Globo*, May 03, 1998). In short, Indian lands in Pará have apparently faced as much pressure as those in Roraima. However, the situation has not generated violent conflicts. On the contrary, many of the conflictive situations have led to negotiation processes between Indians, loggers, *garimpeiros*, and the state.

7.7 Concluding remarks

It has been shown that Pará has been and still is under great pressure. The opening of the territory and the configuration of this state as a frontier area have brought a special dynamic to the region. Within this landscape environmental change and social conflicts are two clear features of Pará's current development.

---

[152] According to some estimations, a meter cubic of *Mogn*o is worth $750 on the international market. In that sense, what the Indians are gaining from that extraction is just a minimal amount of the real value of the wood in the national and international market.

Conflict development

I have shown how social conflicts in Pará evolve around three issues, which are: land conflicts, mining conflicts, and conflicts on Indian lands. The typology of these conflicts has been a mixture of consensual and dissensual conflicts, although most of the conflicts can be placed under the category of consensual. Moreover, the three conflict-issues have experienced the open stage. However the intensity of land conflicts is much higher than mining conflicts and conflicts on Indian lands.

The explanatory variables

The sources of these conflicts are linked to several variables depending on the conflict issue. However, at a general level one could argue that the variables associated with frontier development have been important sources of social conflict in Pará. Thus, allocation of resources and environmental change have played an important role. Two factors related to environmental change have been particularly important, namely deforestation and soil erosion. The conversion of huge areas of forest to pasture brought about constant latent and manifest conflicts between *posseiros*, the landless, *grileiros* and landowners. Thus, not surprisingly southern Pará, which is the main area of social conflict in the Amazon, is at the same time the main focus of environmental change. In addition, I have mentioned that most of the soil is comprised of infertile utisols, so combined with the process of deforestation this has provoked great settlement instability in the area. This situation or unstable settlement created social unrest in the way that the needs for new land by one group meet the needs of other groups. In addition, this creates conflicts with already established groups such as ranchers, Indians, and nut gatherers.

In conclusion, no single variable explains social conflicts in Pará. On the contrary, it is the relationship of several independent variables that have produced such an outcome. However, the most important variables seem to be (mis)allocation of resources, environmental change, and (mal)distribution of land.

Could we conceptualise frontier dynamics as an element of disturbance to the system? Yes, as I have pointed out, frontier dynamics imply the incorporation of new regions into the national economy. A frontier develops from an initial isolation from the national economy to a subsequent stage when agriculture is capitalised, and the newly settled region is progressively linked to the national economy. Concurrently, as has been in the case of Pará, there is heavy immigration, an increase in the price of land and the emergence of a labour wage market. In Pará, certainly capitalist production has taken place with the aim of incorporating new areas into the regional and national economy. One of the best examples is the PGC, thereby the frontier dynamics has been developed in Pará through the improvement of access conditions to land (highway, railway, roads) as well as the allocation of resources. One of the major consequences of this is that competition for land, capital, and markets become fiercer.

Why has Pará been the focus of most of the social conflicts in the Amazon?

Based on what has been stated in this chapter, the answer is that this attention has occurred as a result of the frontier dynamics, which include a great amount of (mis)allocation of resources in the area and, consequently, the opening up of the territory, promoting occupation by several different sets of social actors. The frontier dynamics has spurred on the investment of powerful businessmen and enterprises from the south, and at the same time has promoted the occupation of the territory by an army of poor people and landless from north-eastern and southern Brazil. The entropic process is accelerated when these sets of actors interact with the local people, basically Indians and nut collectors. In short, the co-existence of different social

structures within an unregulated physical space has created conflicts rather than resolving them.

CHAPTER VIII. A COMPARATIVE APPROACH TO THE CASES OF RORAIMA AND PARÁ: UNDERSTANDING SIMILARITIES AND DIFFERENCES

What we call man's power over nature turns out to be a power exercised by some men over other men with nature as its instrument. (C.S. Lewis)

8.1 General background for this chapter.

8.1.1 The comparative analysis

I presented in chapters VI and VII a diagnosis of Roraima and Pará. In those chapters the aim was to unravel the nature of social conflicts by analysing some independent variables which could explain the outcome of the dependent variable. Thus, particular attention was paid to environmental change. In this chapter the main objective is *to provide an understanding of what kind of differences and similarities are found between Roraima and Pará as subystems, and how these differences and similarities are related to the system dynamics.*

The research strategy followed here will explain the major regularities of the subsystems in a comparative way. This analysis implies breaking down the whole into parts, yet simultaneously considering the parts in relation to the whole. In short, it is my goal to compare Roraima and Pará without losing track of the Brazilian Amazon, but at the same time without allowing the Brazilian Amazon to obscure the internal dynamics of Roraima and Pará. Taking into account that chapters V, VI and VII have illustrated the importance of having a systemic perspective when understanding the Brazilian Amazon, this last chapter focuses more on the comparative performance between different variables in the states of Pará and Roraima. Nevertheless, section 8.5 of this chapter reinforces the importance of such a systemic perspective for understanding current developments in Roraima and Pará.

To carry out the above task I will use a comparative methodology, which can provide a reliable base to make a statement about the commonalties between Roraima and Pará. The comparative method is used to determine the different combinations of conditions associated with specific outcome processes. Moreover, it is based on a "logic method", which uses two of Mill's methods of inductive inquiry: the method of agreement and the indirect method of difference (Ragin: 1987, pp.14-15). The problem that social scientists face, Ragin (1987) adds, is the unravelling of empirically relevant causal combinations. Social phenomena are complex and difficult to unravel not because there are too many variables affecting them, although the number of causal variables is important, but because different causally relevant conditions can be combined in a variety of ways to produce one given outcome. It is the possibility of studying the relations between independent variables that produce one given outcome that makes the comparative analysis appropriate for the present study.[153] In order to

[153] Ragin argues that the statistical method is not combinatorial, that each relevant condition is examined in a piecemeal manner. It is difficult to use this method to address questions concerning the consequences of different combinations of conditions. To investigate combinations of conditions, the user of the statistical method must examine statistician interactions. The examination of a large number of statistical interactions in variable-oriented studies is complicated by collinearity and by problems with scarce degrees of freedom, especially in comparative research where the number of relevant cases are often high. For example, the study of different combinations of seven preconditions would require a statistical analysis of the effect of more than one hundred interactions (Ragin, 1987: p.915).

see the specific contribution of environmental change and the other four independent variables to social conflicts I use John Stuart Mill's indirect method of difference in comparative analyses, even though it is normally placed within a case-oriented comparative method.[154] This implies that I assume a close correlation between sources and outcome in Roraima and Pará. The indirect method of difference will be useful in order to establish patterns of invariance through the cross-tabulation of sources-outcome, as well as to reject competing propositions of the source of social conflicts in Roraima and Pará. This applies for instance to the particular contribution of environmental change to social conflicts.[155]

However, I do not interpret the relation between sources and outcome in a mechanical way, because, as I have pointed out, the links among independent variables are of paramount importance for understanding the outcome (social conflicts). In short, even though I take one variable at a time and look at how Roraima and Pará compare, I am aware that the independent variables interact in the sense that changes in one may produce changes in others. Section 8.2.3 provides a good example of the relationship between allocation of resources and changes in land ownership in Pará and Roraima. In addition to understanding the research problem as a whole, a brief analysis of the relationship among independent variables is carried out in section 8.2.6.

8.1.2 Similarities and differences in open subsystems

Comparative analysis means to first unravel the similarities and differences. Taking into consideration the macro-perspective used in the present study (see chapter III), such similarities and differences can be understood according to the following conditions. In the first case (similarities) one subsystem may have one or more variables, each of which varies comparably to a variable in another subsystem. If these comparable variations are so similar that they can be expressed by the same function, then a *similarity* exists between the two subsystems. If different functions are required to express the variations, there is consequently a *difference*. The comparison will provide us with a basis for making statements about empirical regularities and for evaluating and interpreting data through the use of theoretical criteria.

The potential differences and similarities within the Brazilian Amazon at a theoretical level could be explained by looking upon Roraima and Pará as concrete open subsystems whose boundaries are at least partially permeable, permitting sizeable magnitudes of certain sorts of matter-energy or information transmission to cross them. This is important in order to understand that the value of the dependent variable (social conflicts) is not only the result of the internal dynamics of the subsystems, but is also associated with the system (see section 8.5). The open subsystems of Pará and Roraima also means that entropy is a permanent feature. In empirical terms this means that social conflict is a permanent characteristic of those states, understanding that entropy may increase, remain in steady state, or decrease.

---

[154] According to Ragin (1987), the two general strategies of comparative research are case-oriented, which is best suited for identifying invariant patterns common to relatively small sets of cases. The second one is the variable oriented approach which is best suited for assessing the probabilistic relationship between features of social structures, conceived as variables, over the widest possible population of observations. However, both of them are to a certain extent complementary.

[155] This type of reasoning adopts the following structure: Even though it appears that X may be the cause of Y in case A, it is not, because case B has X but lacks Y. This is a way of rejecting competing explanations to reinforced conclusions.

To carry out the comparative analysis I will divide this chapter into five sections. Section 8.2 presents a comparative analysis of the performance of the four independent variables in Roraima and Pará. Section 8.3 deals with the comparison of the value of the dependent variables in Roraima and Pará, and will be divided into two parts. In the first, I will compare the conflict issues, and in the second I will compare conflict typology by correlating conflict issue and conflict typology. Section 8.4 focuses on the main actors in Roraima and Pará. Based on a comparative perspective, attention is paid to the actors that are characterised by conflictive behaviour. Section 8.5 then explains the importance of system and supra-system factors when understanding the current dynamics of Roraima and Pará. The final section, 8.6, provides the main findings by relating the four independent variables to social conflicts. This will be done by applying the indirect method of difference.

8.2 A comparative analysis of the independent variables

Before I begin a comparative analysis of the potential sources of social conflicts in Pará and Roraima I would like to make a few observations on the sources as a whole. As I have mentioned, this study is built on a systemic perspective. This means that the potential sources of social conflicts do not operate in isolation, but on the contrary, they are related to each other and they have to be understood in the context of broad national categories. Therefore, the development of the sources must be understood within two general national categories: security and national interest. The following paragraphs attempt to provide an overview of how the different independent variables have to be understood within the general notions of economic and security interest. This does not mean that one option excludes the other. On the contrary, in most of the cases both economic and security interest have to be considered when understanding one given independent variable and as such they are two faces of the same coin.

As I have stated before, when considering the entire Amazon one can see that state intervention in the Amazon has followed two main imperatives: firstly, the promotion of economic activities and secondly the assertion of authority in the region. Thus, the performance of the independent variables have to be understood within this context of economic and security interests. The following paragraphs provide an overview of such situations. Economic imperatives have influenced the direction and development of the potential sources of social conflicts in several ways. For instance, the independent variable environmental change has been clearly influenced by economic imperatives. In briefly reviewing the sources of environmental change one can form a better picture of the argument. Thus, road building has been a basic mechanism for penetrating the area for economic and security interests. At the same time, road building has contributed to promoting other economic activities such as cattle ranching, mining and logging.

Development policies in the Amazon have encouraged investment in large projects, especially cattle ranches and mining. Cattle ranching was promoted as the economic activity that could “save” the economy of the region. Mining exploration was seen as an economic activity that could bring the region into national and international markets. Dam construction was conceptualised as the main tool for fostering the development of other activities such as mining in the Amazon, as well as promoting industrialisation for the whole country. Finally, the expansion of logging has an economic motivation, especially now that timber sources in south-east Asia are decreasing. Thus, this activity is currently perceived as a new source of income for the region and for the country. The development of the sources are evidently influenced to a great extent by economic imperatives which aim to foster export and to promote industrial growth. Thus, this model that can be called growth-oriented since it reflects the tendencies to engage in a nation building process.

In the same way, allocation of resources can be placed within a general pattern of behaviour, namely economic interest. The above statement is supported by the data that has been presented in this study. Therefore, it is necessary just to mention that economic incentives are a crucial element for understanding the development of the Amazon. As indicated by Schneider (1995), much of the economic activity in the Amazon in the 1970s and 1980s was stimulated by government policies, in the form of subsidised credit, regional fiscal incentives, and differential taxation.

The second national category is security. The state's goal for the Amazon has also been shaped by its own political preoccupations with territorial security and internal order. If one thinks of the relationship between security imperatives and the evolution of some potential sources of social conflicts one can easily perceive such a relationship. For instance, take into consideration the variable of population growth, when the population growth rate for Brazil as a whole slowed after the 1960s. In the Amazon, however, population growth accelerated sharply after the 1960s. Two reasons behind this are the mechanisation of agriculture in the south and the droughts in the north-east that created a large number of landless and caused an increase in political tension. This situation lead to demands for land reform, which the state hoped to address by opening the Amazon to colonisation and exploitation. In this sense, the variable of population growth in the Amazon is related to the fact that the Amazon was seen as an escape valve for the social unrest generated elsewhere in Brazil.

What I would like to point out is that the strong migration process to the Amazon and, consequently, the performance of the variable of population growth can be thought of in terms of the security interest. Thus, the process of rapid modernisation of the agricultural sector in southern Brazil generates more polarisation in the land tenure system, which has profound consequences for land ownership, employment and of course the process of migration to the Amazon.

Large number of landless came to the Amazon in search of land and a future. Thus, the organisation of settlements was also inspired by security factors. Organised settlement in the Amazon started in 1972 with the construction of the Transamazon highway under the programme of national integration. The plans were basically to settle families from the over-populated north-east where severe land tenure problem exist.

In addition, another variable that is related to security preoccupations is land distribution, and this occurs for two reasons. First of all, one of the main security concerns in Brazil has been the unfair and skewed land tenure system due to the fact that this variable is related to most of the violence in the Amazon. As a response Brazilian governments have formulated a series of land programs aiming to give plots of land to the new migrants. This only helped to diffuse possible social tensions.

Finally, when considering Brazilian legislation as a potential source of social conflict, one can easily perceive the security and economic interests behind it. In fact, the clearest examples have been the process of demarcation of Indian lands, as well as the reported fact that the army is the largest land owner in the Amazon, having control over all the border regions as well as most of the areas alongside the main roads of the Amazon. It should be remembered that the demarcation of Indian lands has been a security issue, especially when the groups involved are living close to border regions such as the Yanomani in the state of Roraima. Similarly, the economic interests have been central in the process of formulation and implementation of legislation in the Brazilian Amazon. Most of these problems are linked to the political and economic power of the large Amazonian landowners who have a strong influence in Brasilia. This is central to understanding the "direction" of the law. An exemplary situation is found in the way in which the several land reform programs have been conceived. In the same way, a great part of the ambiguity of Brazilian law pertains to the strong economic interests of corporate groups that make it extremely difficult to provide full

rights to the local population. For example, there are the legal disputes between *garimpeiros*, mining companies and Indian populations. What is clear is that the promulgation and most importantly the implementation of Brazilian legislation has been clearly influenced by economic and security interests.

8.2.1 Environmental change

As a final remark of this introductory part, it is important to argue that the security dimension is not separate from the economic one. They must be considered together, as a whole, in order to understand the development of the Amazon and the behaviour of the agents (section 8.4). Thus, the economic growth of the Amazon has been central to the Brazilian military. The Amazon was perceived as the source of raw materials to fuel the plans for Brazil. As such, the Amazon was to be developed for national security reasons and for the prosperity of Brazil. As I previously mentioned, by environmental change I mean a destabilising interference in the ecosystem's equilibrium. In that sense, environmental change includes both degradation and depletion of natural resources. As could be seen from the chapters VI and VII the sources of environmental change in Roraima and Pará are similar. However in a comparative perspective, it will be noted that their development and contribution is quite different in many cases. The most important sources of environmental change for both states are: agropastoral expansion, colonisation schemes, road building, logging, dam building, mineral exploitation, and urban expansion. What is important about the sources of environmental change is that they do not operate in isolation. On the contrary, it is their interrelationship that explains why environmental change may ultimately accelerate and/or precipitate social conflicts. In the following section I will briefly present the performance of these sources in a comparative perspective, and conclude by measuring the outcome of all the sources through time-series data on deforestation rates in Roraima and Pará. As will be noted, I do not assess each source of environmental change in detail since that has already been done in the previous chapters.

8.2.1.1 Agropastoral expansion

According to what I have previously pointed out, cattle ranching is the leading factor of environmental change in both states. In Roraima this has been particularly evident in the northern part of the state where the *cerrado* ecosystem exists. In Pará, the southern part of the state has been the most affected by development of cattle ranching. A common factor for both states is that road building has been important in contributing to the development of this sector. For example, there is the construction of the BR-174 in Roraima, and the construction of the Belém-Brasilia highway in Pará, the Transamazon highway, and many of the feeder corridors. In terms of agricultural development, squatters who practice shifting cultivation have been the leading agents in the conversion of forest to land's subsistence crops (rice, beans, maize and cassava), to perennial crops (cocoa, pepper, coffee, orange, bananas), and more commonly, conversion to pasture in a second stage (May & Reis, 1993: p.11).

8.2.1.2 Colonisation schemes

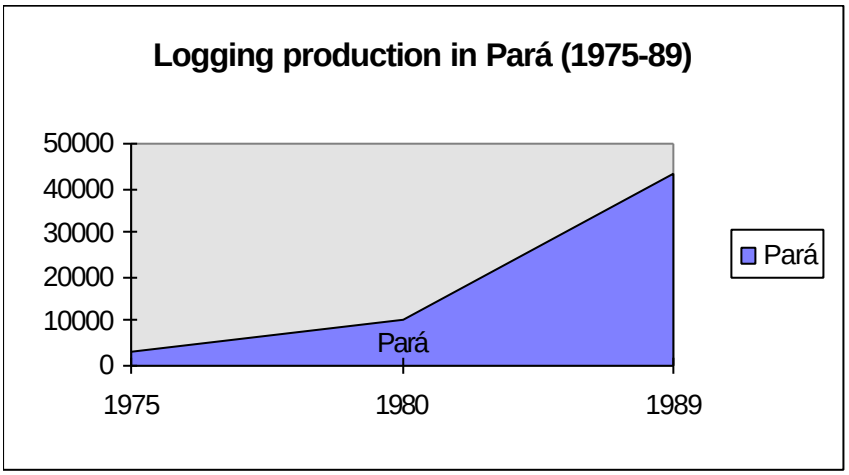
The development of colonisation schemes has been determined in many ways by road building. In Pará, for instance, deforestation is heavily concentrated in areas of rapid settlement opened up by roads. Moreover, colonisation projects in Pará are located close to major gold fields such as the projects of Marabá, Tucumã, and Altamira. The colonisation in both states has had two dimensions, first the colonisation schemes managed by the government, and secondly spontaneous colonisation. Thus, even though the government managed much of the colonisation during the 1970s, there have been many people coming to these states without any support. It has been argued before (see chapter VII) that colonisation

schemes and the activities associated with it is the second most important source of environmental change in Pará. In Roraima however, its manifestation has been absolutely minor, probably due to a more difficult access to the state as well as the geographical isolation of the territory. In Roraima the government has managed few colonisation schemes and most of the people coming to the state have arrived as a result of boom activities such as mining.

8.2.1.3 Logging

Logging was the most important economic activity of Roraima in the late 1970s and the beginning of the 1980s, yet such development was due to specific circumstances that can be explained by the boom years of the Venezuelan construction industry. In general, logging has not since been of relevance in Roraima's economy. In Pará, on the contrary, logging is an activity undergoing an extremely rapid growth. Today hundreds of sawmills have been installed in the state, in addition some Asian companies have already started operation in the area. According to the data available the logging production in the state of Pará has grown from a production of 3,942.1 cubic meters in 1975 to 10,283.9 in 1980, and to 43,138.7 cubic meters in 1989 (see graph 10). Finally, once again road building has contributed to the development of this activity. For instance, the PA-150 that connected Marabá to Conceição do Araguaia and Redenção transformed the timber industry in Pará by giving access to the world's richest stand of Mahogany trees.

Graph 10: Increase of logging production in Pará (1975-1989). Numbers in thousand cubic meters



Source: Producção extractiva vegetal 1975, 1980, 1985. IBGE. Produção da extração vegetal e da silvicultura 1989. Brasil. In Silveira (1993).

8.2.1.4 Mining

Mining activities have been pointed out as a contributor to environmental change. However, it has been said that due to the nature of this activity a large disruption has not occurred, even though the disruption in the area occupied by such activities is extensive. For instance, in *garimpagen* virtually all the vegetation is stripped from areas of mining and this is usually along the streams, which causes total transformation of watercourses. Thus, the churning of river sediment not only pollutes the drinking water, but also disrupts the reproductive cycle of fish (MacMillan, 1995: p.49).

The mining sector is of great importance in both states, but the scale is quite different. It has been shown how Pará, due to the phenomenon of frontier dynamics, has experienced a major development of the formal sector, especially through the Greater Carajás Program. Most mineral companies preferred to work in Pará where RADAM Brazil had identified more accessible deposits lying outside Indian reserves. In Roraima, on the contrary, most of the disruption could be related to *garimpagen* in the northern part of the state, notably in Indian lands such as the Yanomani and Raposa/Serra do Sol.

8.2.1.5 Roads

In the case of Pará, road building has been a paramount factor on environmental change. During the 1970s, road building in Pará can be placed as the third most important factor of environmental disruption, just behind agropastoral expansion and colonisation schemes. In the case of Roraima, road building has been a contributor to the development of small farming alongside the BR-174, however its importance could not be compared to Pará.

It is interesting to note that road building in many ways is a factor that has spurred on other sources. The above situation is not surprising if one considers that road building is one of the main mechanisms of frontier development. It could be said that this is a substantive element explaining environmental change in Roraima and Pará, because normally environmental disruption has followed road building. In a way the regional differences in road networks explain also the differences in the scale of environmental disruption in Roraima and Pará.

The above argument can be illustrated by comparing the evolution of road building and deforestation in both states during a similar period of time (road building by 1986, deforestation by 1988). By 1986 Pará accounted for 41.2 % of total road building in the classic Amazon, and Roraima only 6 %. This difference matches those found in the level of deforestation in the state. For instance, by 1988 Pará presented 10.2 % of its territory deforested, while Roraima was reported as having reached a level of around 1.2 % (Monteiro, 1992 & May and Reis, 1993).

8.2.1.6 Dams

The final aspect to be commented on when it comes to sources of environmental change is dam construction. Pará confirms my argument in that it is a state where social, economic and environmental dynamics have been shaped by frontier development. In fact, the contribution of dam construction to environmental change in Roraima is insignificant compared with Pará. Thus, due to the national imperative of economic growth Pará has been placed as a priority area for hydropower development. In 1990, Pará was responsible for 82.5 % of the energy production in the classic Amazon. It is also important to note how most of the electrical energy produced in Roraima is consumed locally, contrary to Pará. The above information only shows that in Pará the interregional transfer of energy is great (see table No.31). This has to do with the fact that the primary aim of dam construction in Pará was to provide cheap electricity to stimulate industrial development, and therefore is certainly associated with the idea of looking at Pará as a resource frontier.[156]

[156] It should be said that for the classic Amazon close to 95 % of the electric energy is hydropower, however there is a small production of terminal energy in the area.

Table 31: Electrical energy production and consumption in Pará and Roraima in MW (1988)

State	Production	Consumption
Pará	15,764	5,908
Roraima	147	124

Source: IBGE (1988), and Monteiro (1992).

8.2.1.7 Comparing the outcomes of environmental change

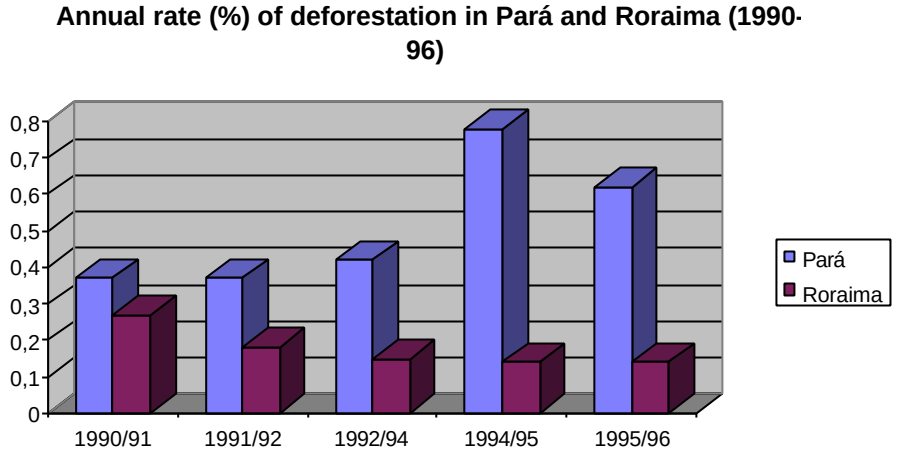
After I have presented the most important sources of environmental change in Pará and Roraima in a comparative perspective, I want to compare the outcome (value) produced by these sources. Thus, the outcome of the variable environmental change is determined by the rate of deforestation associated with the sources mentioned above. To do so, I use time-series data to compare the evolution of the deforestation rates in Roraima and Pará. In order to measure this variable I will use data from surveys based on Landsat IM imagery from the Brazilian National Institute for Space Research (INPE). INPE has provided information about deforestation rates and the spatial distribution of this process. Here I present two types of data: firstly, table No.34 presents the percentage of the area deforested in Pará and Roraima for the period 1988-96, and secondly, data presented in graph 11 shows the percentage of annual increment in the rate of deforestation in both states. For the purpose of this chapter it is undeniably important to compare the trends and scope of deforestation in Pará and Roraima based on this quantitative data displayed in relative numbers.

Table 32: Evolution of deforestation in Pará and Roraima. Deforested areas include areas of pasture, agriculture and secondary vegetation. Data in percentage for the period 1988-96

State	**Deforest. 1988**	**Deforest. 1990**	**Deforest. 1994**	**Deforest. 1996**
Pará	13.2	14.4	16.0	17.6
Roraima	0.3	0.4	0.5	0.5

Source: INPE (1998) http://www.inpe.br/amz-04.htm

Graph 11: Annual rate of deforestation (%) in Pará and Roraima (1990-96)



Source: INPE (1998) http://www.inpe.br/amz-04.htm

The above INPE data confirms the tendency of greater environmental change in Pará than in Roraima. The data exhibited in table No.32 and graph No.11 give us an idea of the enormous differences. Taking a look at the nominal numbers one can easily prove this tendency. For instance, in graph No.11 it is evident that the annual rates of deforestation have been consistently higher in Pará than in Roraima. The numbers for the data in graph No.11 are as follows: 1990-91 Pará (0.31 %) and Roraima (0.27 %); 1991-92 Pará (0.37 %), Roraima (0.18 %); 1992-94 Pará (0.42 %), Roraima (0.15 %); 1994-95 Pará (0.78 %), Roraima (0.14 %); 1995-96 Pará (0.62 %) and Roraima (0.14 %). To sum up this data presented, this first independent variable shows an enormous difference in its value when it is compared between Pará and Roraima.

Finally, it is important to say that the above data, as elaborated by INPE, includes pastures, agriculture and secondary vegetation as areas of deforestation. In addition, it should be said that most of the deforestation registered in the Amazon during these years has been close to main roads, especially to the road network of eastern Pará. Thus, in most studies on deforestation in the Amazon, it is common to indicate that the area most affected by deforestation is around the so-called Zona Bragantina, located on the eastern border of Pará with Maranhão and to the north of Tocantins.

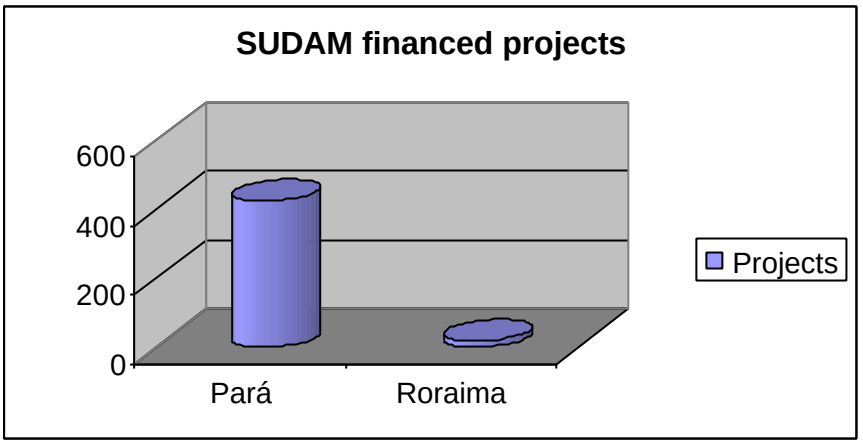
To conclude, I argue that despite the relativity in measuring environmental change in the Amazon there are two aspects that can be confirmed, and they are: firstly, the fact that most of the deforestation in the Brazilian Amazon occurred during the 1970s and the beginning of the 1980s, and secondly, the distribution of environmental change measured through deforestation is highly uneven, as the most extensive disruption has taken place in the eastern part of the state of Pará.

8.2.2 Allocation of financial resources

The performance of allocation shows an enormous difference in the state of Roraima and Pará. To empirically distinguish difference, I use the number of projects with fiscal incentives and subsidies given by the Superitendency for the Development of the Amazon (SUDAM), and by the Investment Fund for Amazonia (FINAM). Thus, graph No.12 shows a great difference between Pará and Roraima concerning the allocation of resources by SUDAM for development of cattle ranching, agriculture, logging and other activities. By 1986, Pará

received SUDAM resources for a total of 424 projects, while Roraima received resources allocated for just 18 projects.

Graph 12: Number of SUDAM projects approved in Roraima and Pará until 1986



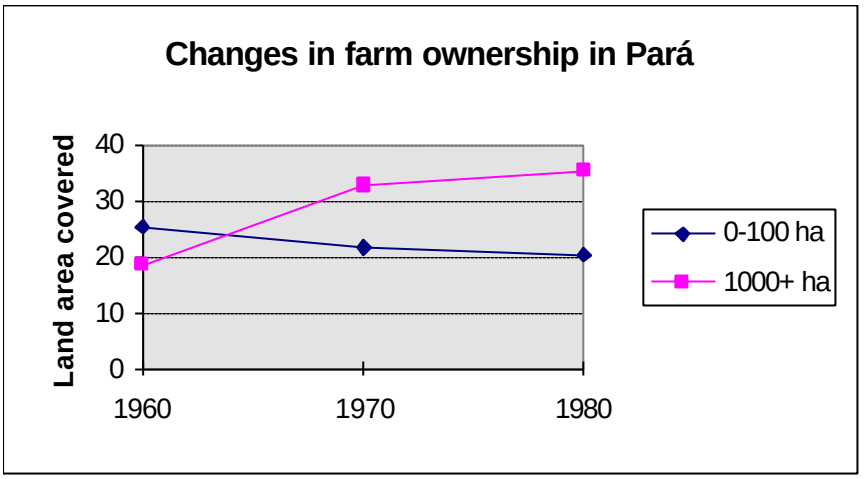
Source: IBASE (1990)

Another indicator is found in the incentives given by FINAM. According to Schneider (1995), by 1985 FINAM approved a total of 228 projects in Pará as opposed to only 8 in Roraima. In order to provide a better view of the differences between the way resources are allocated within these two states I will present the data by SUDAM and FINAM in relative terms. Here I provide the number of financed projects compared with the number of total hectares of land accounted by Pará and Roraima. Thus, Pará has a total of 22,520.229hectares, which means that one SUDAM project was financed per every 53.113 hectares. On the contrary, Roraima with a total of 2,976.817 hectares was financed an average of one SUDAM project per every 165.378 hectares. In the case of FINAM, the same tendency is perceived: in Pará one project was financed per every 98.772 hectares compared to Roraima, which received only one project for every 372.102 hectares.

8.2.3 Land distribution

For the purpose of comparative analysis, the basic variable related to distribution used will be land distribution, measured through the GINI coefficient of land distribution, and the percentage of area owned in Roraima and Pará, by the smallest 50 % of the total farms and the largest 5 % of the total farms. When considering the data presented for variable allocation, a partial relationship could be established between the allocation of incentives and changes in ownership of land in Pará and Roraima. For instance, in Pará during the decade 1970-1980, land concentration worsened, occurring at the same time as the period of most incentives. As can be seen in graph No.13, the land area covered by properties over 1,000 hectares increased from 18.5 % in 1960, to 32.6 % in 1970, and to 35.4 % in 1980. During the same period the land area covered by properties under 100 hectares fell from 25.5 % in 1960, to 21.8 % in 1970, and to 20.6 % in 1980.

Graph 13: Changes in farm ownership in Pará (1960-80)



Source: IBGE (1975, 1984), and A. Hall (1991).

It is important to mention, however, that the problem of land concentration is present only in Pará. In that sense, if one refers to table No.35 one will notice that Roraima presents a similar pattern. Table No.33 displays the adjusted GINI coefficient elaborated by Rodolfo Hoffman (1982, 1987). The important thing about this variation is that the classic coefficient of land concentration normally does not take into account the number of landless families. Therefore, if one includes these families, the concentration will be higher and it will better reflect reality. Evidently, the worse period once again corresponds with the decade of major incentives by SUDAM and FINAM (1970-1980). From that number it could be assumed that tax exemption and subsidised credits went to well-off people with land titles. This contributed to the further distortion of the distribution of wealth in both states. However, the level of concentration is apparently very high, but decreasing slightly, which coincides with the regional tendency for the whole Amazon.[157]

Table 33: GINI Coefficient of land distribution in Pará and Roraima (1960-85)

State	1960	1970	1975	1980	1985
Pará	0.831	0.882	0.868	0.843	0.820
Roraima	0.669	0.618	0.887	0.788	0.754

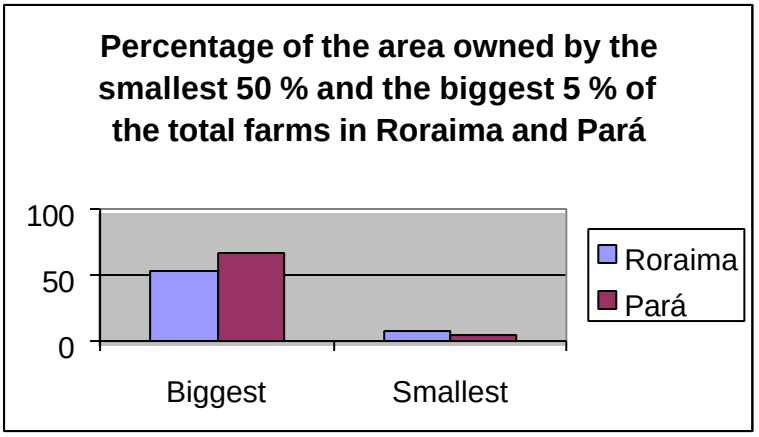
Source: R. Hoffman (1982, 1987). Revista Reforma Agraria. Vol. 12, No 6 (Nov-Dez, 1982) and No 2 (Ago-Nov, 1987).

The problem of land distribution clearly has a systemic nature, which is not peculiar only to Roraima and Pará. Brazil and the Amazon as a whole present a very unjust and skewed distribution. In Brazil, for instance, 0.7% of farms over 1,000 hectares covered 51 % of the agricultural area by 1980 (Fearnside, 1986). Graph No.14 is an attempt to show how skewed the land distribution is in Roraima and Pará. According to data from *Censo Agropecuario 1985*, the percentage of the area owned by the smallest 50 % of the total farms was 8.2 % and

[157] In 1991, after the Demographic Census, the IBGE released a new index in which values are a bit lower but still quite high. They were 0,6015 for Pará and 0,6170 for Roraima.

4.1 % for Roraima and Pará respectively. Meanwhile, the percentage of the area owned by the largest 5 % of the total farms was 53.5 % and 66.9 % for Roraima and Pará respectively.

Graph 14: Percentages of the area owned by the smallest 50 % of the total farms and by the biggest 5 % of the total farms in Pará and Roraima (1985)



Source: Censo Agropecuário (1985), and P. Choji (1994).

In comparative terms, it is evident from the table No.33 and graph No.14 that Pará represents a less skewed distribution than Roraima. However, there are very few differences between Roraima and Pará, and both of them reflect regional patterns of maldistribution illustrated by the problem of land concentration. This argues that the independent variable does in fact have a systemic nature.

8.2.4 Population growth

In comparative terms both states have experienced an important increase in population. However, population growth is not only the result of an increase in the rate of fertility, but of the migration process that Roraima and Pará have faced. For instance, Roraima went from an average population growth rate of 3.42 % for the period 1960-70 to 7.04 % for the period 1970-80. Pará went from 3.32 % in the decade of the 1960 to 4.80 % in the 1970s. In addition, there are two important aspects to mention that are common to both states. First there is the low population density (see table No.34), and secondly the urbanisation trend. As a result, one of the most striking features of Roraima is the large amount of urban population concentrated in Boa Vista. In the case of Pará several towns have emerged as a result of the colonisation process. It is also interesting to note how the process of urbanisation occurs despite a low population density, a fact that Ana Luíza Ozorio (1995) calls precocious.

Table 34: Changes in population densities in Pará and Roraima. Inhabitants per km2 (1960-96)

State	1960	1970	1980	1988	1996
Pará	1.25	1.77	2.77	4.01	5.0
Roraima	0.13	0.18	0.34	0.57	1.07

Source: IBGE (1986) Anuário Estatistico do Brasil, and Indicadores Sociais e Demográficos Mínimos (1996). Rio de Janeiro.

An important characteristic of the population in these states, as well as in the entire Amazon, is their high level of mobility. Part of the explanation for this could be found in the

fact that many of the activities that employ people in these states are predatory in the sense that they destroy resources in the production process, for instance through cattle ranching, logging, and mining. Hence, the rapid exhaustion of these resources forces the activity to relocate regularly over time as booms turn to bust. These boom and bust cycles in the Amazon could explain why migrants move repeatedly within the region. In Roraima the informal mining sector has been an important factor of attraction for this volatile population. For instance, between 1980 and 1989 Boa Vista's population grew at an estimated rate of 16 percent annually (Naeara, 1992: p.38).

The urbanisation process has also been associated with some economic activities and road access. In the case of road access most Amazonian towns have appeared along roadsides and major intersections such as the BR-174 connecting Manaus and Boa Vista in Roraima, and the southern network of roads in the state of Pará. In both cases the urban boom is associated with economic activities, notably the gold rush. Moreover, the opening up of the agricultural frontier in Pará stimulated the massive migration of settlers into the state giving rise to several urban towns, especially in southern Pará. The following towns in Pará experienced an enormous population growth during the decade 1970-80:[158] Altamira (11.73 %), Conceição do Araguaia (15.8 %), Itaituba (11.63 %), Itupiranga (11.32 %) and Paragominas (13.01 %). Along with this, in the 1980s Marabá was one of the fastest growing towns (11.2 %). In 1980 the majority of the population of Marabá was already urban. The town served as base for the Carajás Iron-ore Project, and today it is the third largest city of Pará after Belém and Santarém. Finally, today the municipalities of Marabá, Curionópolis and Parauapebas are 70 % urbanised. However, for the whole state the difference is less, but there is still an urban majority.

In the case of Roraima, even though it is relative isolated, most of the population is urban. In 1991 its total population was 215,950, with 139,466 urban and 76,484 rural (IBGE, 1990). To illustrate this, the town of Caracaraí experienced a population growth of 10.59 % during the 1970s and 1980s. However, this is not a phenomenon typical of Roraima and Pará, but a general feature. In fact, between 1960 and 1980, the urban population in the Brazilian Amazon grew by 10.9 % per year while the rural population grew by only 3.9 % (IBGE, 1984).

In summary, even though Roraima and Pará experienced a dramatic increase in population primarily during the 1970s and 1980s, it is my opinion that in the near future these states are not likely to suffer overwhelming population influx from outside the rest of the country. The reasons are basically that fertility rates in Brazil are declining, and the economic experiences in the Amazon are not very positive to promote a strong new migration process, with the exception of a potential new mining discovery such as the one that occurred in Serra Pelada. In addition, experience has proven to the Brazilian population that settling in the Amazon is not an easy enterprise.

8.2.5 What could we learn from the independent variables?

The study of the above four independent variables has been done one by one, but while maintaining a comparative perspective. This was done in order to achieve the primary goal, which is to try to separate the specific contributions of each independent variable to social conflicts in Roraima and Pará. Thus, one can see how the presence or absence of a particular given independent variable can increase or decrease the probability of social conflicts in these states. However, I have noted that in order to understand the total contribution it is necessary

[158] Data from "Demografía e Mão de Obra na Amazonia" by María José Jackson Costa. Coleção Igarapé. NAEA. Belém, 1990.

to recognise the relationship amongst these independent variables. I have illustrated briefly how allocation and distribution are related, and, at the same time, how environmental change is closely related to allocation, distribution and population growth. The legal system is closely related to distribution and allocation and so on. In summary, even though I have presented the independent variables separately, relationships among them can not be ignored, and therefore, the following paragraphs are an attempt to reflect this fact.

A significant aspect to be learned from the four independent variables is that there is a definite relation between them. In a way all of them form a whole, which I have tried to understand by its constitutive parts. For instance, population growth as a result of a large number of landless and *garimpeiros* arriving in Pará is clearly linked to other sources such as the legal system, because chaotic status of land titling in the Amazon promotes migration to the region. It is similarly related to the variable distribution, considering that the unfair distribution existing in Brazil acts as a mechanism of population movement (migration of poor people). Allocation of resources is also related to environmental change in the way that many areas where resources were allocated present a strong pattern of environmental change, however it does not mean that allocation determines deforestation. At the same time in the case of Pará a particular association could be established between allocation and land distribution (see graph No.13). In addition, it is clear that the legal system has been related to the structure of allocation, distribution and environmental change. In the latter case the Brazilian legislation has promoted environmental change through the policy that land clearing was a valid mechanism for one to assure the possession of land, and then only afterwards request a land title. In a similar way the legal system gave speculators the opportunity to seize large incentives, thus promoting more inequality in these states, especially in the case of Pará.

Another clear relationship can be found between population growth and environmental change. It could be argued that this interplay has been fundamental in precipitating group identity clashes. Group identity clashes are an important feature in Roraima and Pará due to the fact that an important number of groups with different social backgrounds have come together to share the same physical space. It could be claimed that in many cases the group identity conflicts arise from the incompatibility generated by the different social structures within the confines of the same physical space. Hence, the incompatibility of social structures in Roraima and Pará has been basically caused by a large movement of population coming into these states. The process of environmental change has displaced these large sectors of population in many cases. Thus, the combination of thousands of people coming to these states and the displacement suffered by them due to environmental change has provoked a condition of deprivation and unequal access to natural resources, thereby giving rise to inter-group hostility in which a given group will reinforce its own identity while attacking outsiders.

Roraima is a good example of the above complexity. In this state the incompatibility of the social structure has resulted in group identity conflicts. In Roraima there is one set of values, beliefs and norms held by the native population such as Indians and *riverinhos* and another, very different set used by the *garimpeiros* and *fazendeiros*. Thus, one can understand why the large arrival of *garimpeiros* to Roraima has resulted in violent conflicts between Indians and small-gold prospectors. In Pará, a similar pattern has been experienced with the difference that the web is far more complex due to the larger number of actors. In fact, Pará has not only experienced the arrival of thousands of *garimpeiros* as Roraima, but in addition the arrival of thousands of landless competing for physical space with large and medium landowners, Indians, nut-gatherers, miners, mineral companies, and logging companies.

8.3 Comparing the performance of the dependent variable in Pará and Roraima

I start by pointing out again what was stated in chapter III in order to relate the development of this chapter to the arguments presented in the introductory chapters of this dissertation. Thus, it has been mentioned that the research design used in this in this dissertation:

a. Will specify the particular conflict type and conflict issues in the two chosen subsystems scenarios (Roraima and Pará), explaining its relationship to the independent variables, with particular attention to environmental change.

b. Will explain if the referred conflict type and conflict issues are shaped by the supra-system and system dynamics.

c. Finally, it will show the relationship between conflict type and the conflict intensity. Hence, I will be able to explain if the particular existence of one given type of conflict (consensual or dissensual) defines certain levels of conflict-intensity in Roraima and Pará.

Taking the above elements into consideration this part deals with such model features, and is divided into four sections. The first will show the main conflict issues in Roraima and Pará. Here I will show how land, mining and conflicts over Indian land have been the leading issue within these states. I will look at the dynamics of these conflict issues in a comparative perspective in order to display their intensity. Following the research design formulated in chapter V, I will deal only with open conflicts. This has been the threshold of the dependent variable defined in the theoretical framework. The second section will provide an understanding of the typology of conflicts found in Pará and Roraima. Here I will basically classify the conflicts as dissensual or consensual. In addition I will relate this conflict typology to conflict issues. The third part will be a brief synopsis of the role of the main agents in the dynamics of conflicts. Here I will show not only the most important actors involved in manifest conflicts, but also the different kinds of involvement that they have: confrontation, negotiation, and alliance. The last part will illustrate how the supra-system and system factors influence the dynamic of Roraima and Pará.

8.3.1 Conflict issues

The first statement that should be made is that all the conflict issues are related to each other in one way or another. Therefore, it is inappropriate to think of them as completely separate cases. My way of distinguishing them only represents a point of departure for understanding the main elements involved in the disputes analysed. At a general level I distinguish three issues around which social conflicts in Pará and Roraima develop: land conflicts, mining conflicts, and conflicts on Indian lands.

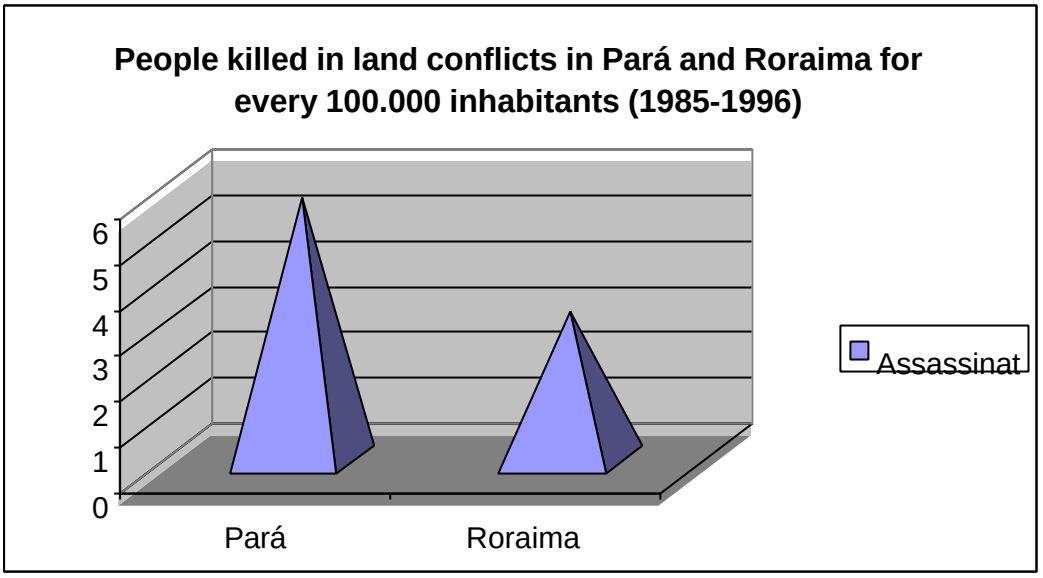
In order to have a precise picture of what is going to be displayed in the following pages it is important to make two considerations. First it should be stated that the quantitative data used in the discussion of the three conflict issues have slightly different time-series. For land conflict I have a longer time-series than for mining conflict and conflict over Indian lands. The above is due to the fact that land conflicts have been the most observed of the two, and moreover, the Pastoral Land Commission has been registering these conflicts for several years. Such a difference is not highly important due to the fact that the most important aspect, at least for the purpose of this dissertation, is to compare the evolution of one given conflict issue between the two states.

Secondly, it is important to consider that I will be using relative numbers for comparative purposes. Thus, in the case of land conflicts for instance, I use the number of people killed in land conflicts for every 100,000 inhabitants. The same procedure is applied in the case of conflict over Indian lands. However, as will be evident in the following pages, the absolute numbers are also used in most of the cases. The reason for this is to provide the necessary support for the relative number.

8.3.1.1 Land disputes: Pará as the leading state

Most of the land conflicts in the Amazon are related to land ownership and land distribution. This is not surprising because, as I have shown already in the analysis of the independent variables, skewed land distribution is a systematic feature affecting both Pará and Roraima. Looking at the relative data featured in graph No.15, one realises that land is absolutely the most important conflict issue in Pará. In addition, graph No.16 demonstrates the complexity of the social actors participating in such conflicts. For instance, manifest conflicts in Pará have not only been between landless and large landowners, but have also risen between *grileiros* (squatters) and *posseiros*. In this case *grileiros* are often engaged with *pistoleiros* (hired gunmen) in order to drive small farmers off the land.

Graph 15: Percentage of people killed in land conflicts in Pará and Roraima for every 100.000 inhabitants (1985-1996)



Source: Pastoral Land Commission (1998)

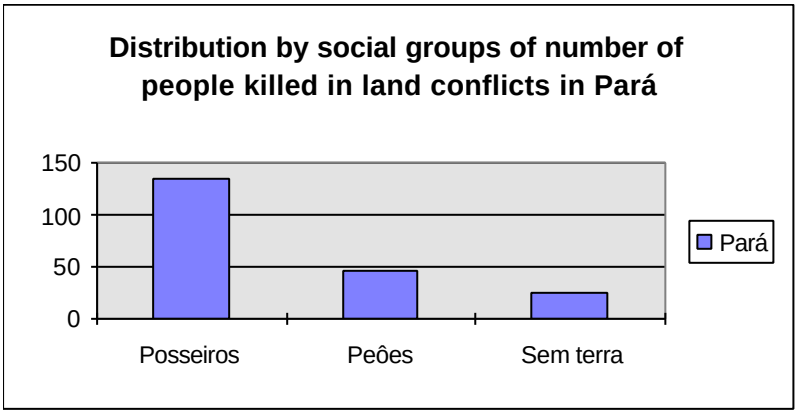
An important difference can be perceived in the comparative number of murders associated with land conflicts in Pará and Roraima. In the period from 1985 to 1997 Pará experienced 291 murders, while Roraima only registered eight cases. In order to provide a better understanding of the differences, I will also provide relative numbers. Thus, I use the total population registered in the latest census (1996) of Pará (5,084,726) and Roraima (247,131) and work out the percentage for every 100,000 inhabitants. The result shown in the graph No.15 supports my original argument that land conflicts are the most relevant conflict issue in Pará. As can be seen, Pará has a rate of 5.72 people killed per one hundred thousand inhabitants, while in Roraima the rate is only 3.24.

It is important to say that even though this data is the most reliable, it is evident that in an enormous area such as the Amazon documenting all cases is very difficult. An important feature from the data is that of the 291 murders registered in land conflicts in Pará, 145 cases

have been identified as committed by *pistoleiros* and *fazendeiros* (hired gunmen and large landowners). Once again it should be remembered that in a region like the Amazon the identification of the murderer has always been a problem. As I have mentioned, the region was previously known for its impunity. In Roraima the number of cases of land conflicts are fewer and considerably less intense. The expansion of ranching especially in the south of Roraima is quite different by Amazonian standards, because it is not accompanied by violence. Part of the explanation is found in the fact that ranching in Roraima is largely not capitalised. Thus, few of the SUDAM and FINAM projects and subsidies were used in Roraima. As a consequence, the competition for areas of land is less fierce than in Pará. These elements made Roraima play in many ways an outside role in the frontier dynamics, and they could be considered explanatory factors for the few land conflicts.

In addition, the data shows (see graph No.16) that most of the victims were settlers without a legal title, known in Brazil as *posseiros* (136), land workers called *peões* and *lavradores* (47), and landless identified as *sem-terra* (25). An interesting aspect to note is that violence associated to the social group known as *Movemento dos Sem-Terra* (MST) became an important feature after 1995. In fact, the 25 assassinations are only recorded in the years of 1995, 1996 and 1997, which in comparative terms means a high ranking level for violence against this group. It should be remembered that in terms of the land-issue now the MST is the most important and organised social group in Brazil. Finally, it is important to point out that the places where most land conflicts leading to assassinations occurred are located in the areas of most intense deforestation as well as the area where most of the incentives were allocated. This means a preliminary association between allocation, environmental change and land conflicts. From the data of the Pastoral Land Commission (1985-97) it is observed that around 90 % of the assassinations occurred in Marabá, Xinguara, Conceição do Araguaia, São Felix do Xingu, El Dorado de Carajás, São Jão do Araguaia, Paragominas, Parauapebas, Rio María, Curionópolis, and Tailândia. Most of these places are located in southern Pará where environmental change is more acute and where most of fiscal and economic incentives were allocated.

Graph 16: Number of settlers without legal land titles (posseiros), land workers (peões), and landless (sem terra) killed in land conflicts in Pará (1985-97)



Source: Pastoral Land Commission (1998)

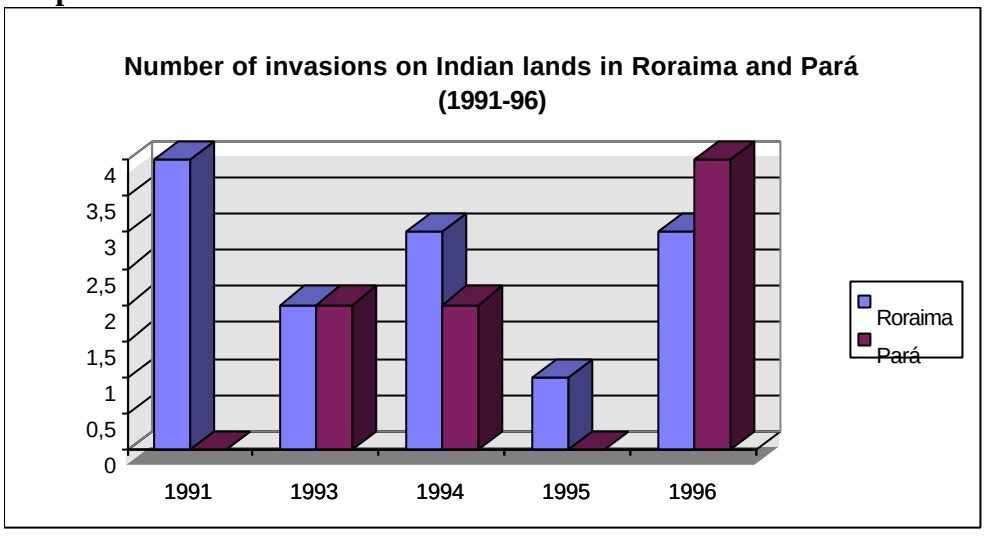
8.3.1.2 Mining issue: Differences in location, negotiation, and the formal and informal sector

Conflicts related to mining activities have been experienced in both states. As such, *garimpeiros*, Indians, mining companies, and the government have been the main actors involved in such situations. The differences in the development of such conflicts can be grouped along three lines of thought. First there is the geographical area, due to the fact that

almost all the mining conflicts in Roraima have occurred within demarcated or non-demarcated Indian lands. Thus, most of the invasions have taken place in the areas of Raposa/Serra do Sol and Yanomani. This situation has been different in Pará where even though conflicts have taken place on Indian lands notably Munduruku II (where in 1996 an invasion of 10,000 garimpeiros was reported), the Kayapó, and Parakanã land, most of the mining conflicts have occurred outside indigenous lands (CIMI, 1996: p.74). In that sense, the cases of Serra Pelada and the Carajás Iron-ore Project are the most illustrative examples.

Noticeable in graph No.17 is that in recent years Roraima has accounted for most of the cases of invasion by miners of Indian land. Pará only rated higher in 1996. The data shows that from 1991 to 1996 Roraima experienced 12 miner invasions and Pará 8. Moreover, the number of *garimpeiros* invading these lands has been far greater in Roraima than in Pará. For instance, in 1993 in one *garimpo* invasion of the Raposa/Serra do Sol in Roraima it was reported 5,000 *garimpeiros* were working close to the rivers Cotingo, Quinô e Maú. In 1996 it was reported that close to 3,000 *garimpeiros* were working in the Yanomani area. In Pará the number of *garimpeiros* invading Indian land has been smaller, with the exception of the Mundurukú II, where, in 1996, close to 10,000 *garimpeiros* were reported to be in the area (CIMI, 1993, 1996). In addition, there has been an important difference in terms of the number of *garimpeiros* killed in conflicts. This is reconfirmed by the fact that most of the conflicts in the mining sectors in Roraima are related to disputes with the indigenous population, as in the period from 1985 to 1997 when only one *garimpeiro* was reportedly killed in Pará, in the area of Rio Maria. However, according to the Pastoral Land Commission (1998), during the same period in Roraima there were 8 *garimpeiros* killed, all of them in disputes with Indians.

Graph 17: Number of miner invasions on Indian lands in Roraima and Pará (1991-96)



Source: CIMI reports: Violência contra os povos indígenas no Brasil 1991, 1992,1993.1994,1995, 1996

The second line of difference is that mining activities in Roraima have been mostly the domain of the informal sector. Almost no conflicts involving the formal sector in this state have been reported, with the exception of some unrest in the south of the state in the area exploited by the Parapanema company. In contrast, Pará has developed a strong formal sector, even though the *garimpo* phenomenon is important. In Pará, both the formal and informal sector have been very dynamic in shaping the structure of mineral conflicts. Thus, very often the conflicts have been between the informal and formal sector, which basically means

between *garimpeiros* and the Companhia Vale do Rio Doce (CVRD) in the area of Serra Pelada. This conflict has a long history, the main period of which started in May 1980, when federal authorities took over Serra Pelada. Nevertheless, in 1981 close to 2,000 *garimpeiros* invaded Serra Pelada, which resulted in conflicts with the CVRD and the military. The reason was that CVRD had some legal claims to the area. By the end of 1981 it is believed that around 50,000 *garimpeiros* were working in the area. From that time the CVRD pressed for the expulsion of the *garimpeiros* and the introduction of mechanised mining. With the recent privatisation of CVRD, conflicts experienced a new dynamic. For instance, due to a dispute over Serra Pelada, a confrontation took place in May 1998 involving 200 *garimpeiros* and the security forces of the Companhia Vale do Rio Doce.[159] In addition, the burning of *barracos* (the *garimpeiros* houses) have often been reported.

The third and final line is related to the way the actors have dealt with disagreements. Here there has been a considerable difference between Roraima and Pará. In Pará, Indians have been able to negotiate with *garimpeiros* and to get royalties for the use and exploitation of mineral resources on their lands. However, in Roraima the Yanomani and the Macuxi have not profited from mineral exploitation either because of their own reluctance and/or internal divisions. In many ways the difference can be explained by the fact that the Kayapó Indians in Pará have a long tradition of negotiating with outsiders, a factor that has facilitated negotiations with *garimpeiros* and the government (see chapter IX). The Yanomani, on the contrary, have been one of the world's most isolated Indian groups. They have only recently experienced contact with people outside their tribes.

Despite the above argument, it is important to ask: *Why then have other acculturated Indian groups failed in their attempts to control mining and demarcation of their lands?* The Kayapó managed a very successful negotiation only because they presented a united bargaining front to the *garimpeiros* and the government. In contrast, the Makuxi in Roraima have had problems in articulating a position due to internal rifts that emerged in their campaigns. That is also explained by the fact that the Kayapó are the least dispersed, grouped in only five villages, but the Yanomani and Makuxi have many more villages and people. In that sense, to reach a consensus is more difficult.

Is there any difference in the way garimpeiros in Pará and Roraima have faced other social groups? Yes, in Pará *garimpeiros* have a better capacity to confront other social groups such as the formal sector and the government. The explanation that I find is that the group-identity situation in Pará was better managed than in Roraima. In fact, it seems to be that in Roraima *garimpeiros* did not identify themselves as a group with social and political objectives. The explanation could be partially found in the fact that *garimpeiros* in Roraima were more dispersed. In contrast, the *garimpeiros* in Pará were heavily concentrated, especially in the case of Serra Pelada. Furthermore they were clear in the role that they had to play as social group as well as against whom they had to fight. This made it easier for Curió to win votes from the *garimpeiros* in Pará than for Romero Jucá in Roraima.

Besides the fact that mining conflicts have taken place in both states, *What other similarities could be traced between Pará and Roraima?* A common aspect of mineral exploitation in Roraima and Pará is that the intense arrival of *garimpeiros* leads to a transformation of the electoral base and makes *garimpeiros* as an important political force. In Roraima, the arrival of around 40,000 *garimpeiros,* plus a large number of people working in activities associated with mining certainly created a strong political base. The above situation can be seen in the fact that a defender of the *garimpeiros*, Romero Jucá, was appointed

[159] Reported by the Brazilian Newspaper *O Liberal* under the title "Vale reforça segurança no Garimpo" (22/05/98).

governor of Roraima from 1988 to 1990. According to MacMillan (1995), Romero Jucá overtly sanctioned the *garimpeiros*' invasion of the Yanomani lands during his governorship. In Pará, a similar situation occurred in 1982. The arrival of 50,000 *garimpeiros* on Serra Pelada contributed to the election of Sebastião Rodriguez de Moura (Curió) as member of the parliament. Curió was the main defender of the *garimpeiros* in their dispute with the CVRD over Serra Pelada, as well as the link with the central government in the negotiations on the status of Serra Pelada.

8.3.1.3 Conflicts on Indian Lands: Roraima as a main ground

I use three indicators of manifest conflicts in Indian lands to elaborate the comparative analysis between Roraima and Pará. These are the numbers of Indians killed in conflict over Indian lands for every 100,000 inhabitants, and also in relative numbers, the number of assassination attempts and number of cases of physical violence towards indigenous communities. I will present the above data in relative terms in order to provide a better understanding of the differences between Roraima and Pará. The data used here is the most reliable as it shows only those cases that have been reported and documented. The following graph (No.18) demonstrates that conflicts on Indian lands is the most important conflict issue in Roraima. This statement is not only confirmed by the data presented in this section, but moreover by the fact that almost all the social conflicts that occur in Roraima take place on Indian lands. To illustrate the situation I can mention the conflict over the Yanomani land, the unrest in the Waimiri-Atroari reserve, and the conflicts in the Raposa/Serra de Sol area (see chapter VI for more details). The dispute over Indian lands in Roraima includes the utilisation of these lands by *garimpeiros*, *fazendeiros*, and *posseiros.* A case in point is also the conflict between Makuxi, Wapixana and well-established ranchers in the area Raposa/Serra do Sol. In this area there are around 178 ranches situated inside the proposed Indian reserve (MacMillan, 1995).

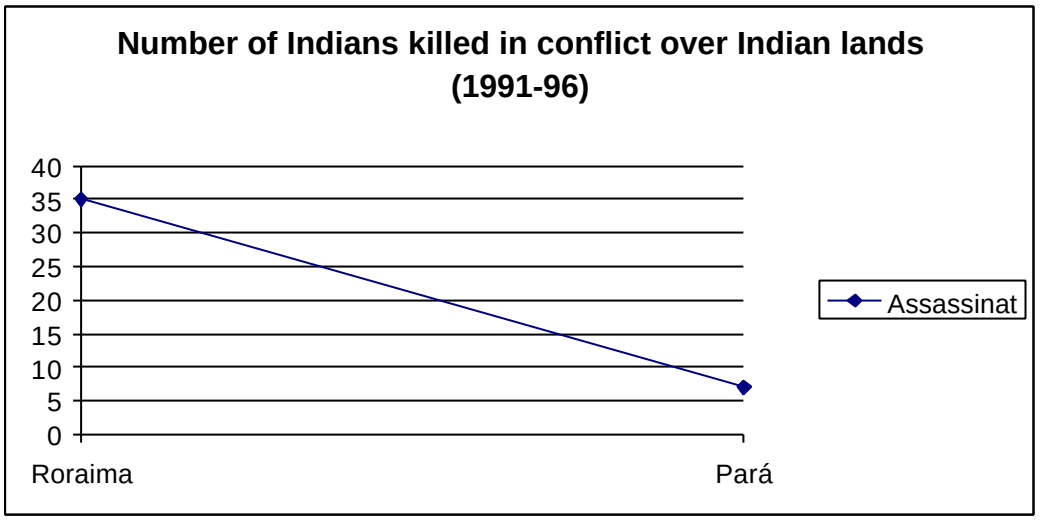
When it comes to casualties, the absolute data shows the preponderance of conflicts on Indian lands in the state of Roraima. The data shows that Roraima saw thirty-five Indians killed between 1991 and 1996, and only seven occurred in Pará. Taking this data in relative terms only confirms the tendency. Thus, if one takes the whole population of both states and make the equation in terms of Indians killed for every 100,000 inhabitants one has Roraima with a very high score (14.16), but in Pará it is very marginal (0.14). It is important to say that in order to get this relative number I have used the total population because there are no exact numbers just for the Indian population in both states. The following graph illustrates my argument.

In order to demonstrate my argument I use two more types of data, namely: number of assassination attempts on Indians, and number of cases of physical violence over indigenous communities in Pará and Roraima for the period 1991-96. In absolute terms, Pará registered only one case of an assassination attempt and five of physical violence, while Roraima accounted for 17 and 19 respectively. The relation is also considered in relative terms and using the same system of cases for every 100,000 inhabitants. When it comes to assassination attempts Pará has 0.02 %, while Roraima has 6.88%. In the case of physical violence, Pará once again has a very low rate (0.10), but Roraima shows a different picture (7.69). These differences are quite significant and corroborate the intensity of conflict over Indian lands in Roraima.

The differences between Roraima and Pará in terms of conflicts over Indian lands can be partially related to the fact that in Pará most mining sites lie outside Indian lands. This has reduced conflicts between *garimpeiros*, mining companies and Indians. However, it does not mean that conflicts of this nature do not exist. I have previously mentioned several examples of this situation. At a general level, both Roraima and Pará have presented a long tradition of

conflict concerning the demarcation of Indian lands. This dissertation has reported the cases of the Kayapó in Pará as well as other Indian groups living in the area of the Carajás Iron-ore Project, and I have similarly explained the cases of the Yanomani, Makuxi, and Waimiri-Atraori in Roraima.

Graph 18: Number of Indians killed in conflicts over Indian lands. Casualties for every100.000 inhabitants (1991-96)



Source: CIMI Annual Report (1991,1993,1994,1995,1996).

Another important factor explaining such differences is that in Pará many of the conflicts have lead to negotiation among the parties involved, a situation quite different from that in Roraima where negotiation has been minimal. I will not go into details here because this point has already been discussed in chapters VI and VII. However it is important to reiterate that in Pará the Kayapó pushed the demarcation of their land through a process of negotiation with the government and *garimpeiros*, but in Roraima the Yanomani saw their land demarcated because of international and national pressure. As a consequence, Indians in Roraima have been unable to control mining on their territories, which presents a difference with Pará where the Kayapó have been very successful in controlling mining.[160]

8.3.2 Can conflict typology explain the development of conflict in Pará and Roraima?

The main task here is to formulate a proposition that can be useful at the analytical level to summarise all the empirical information that I have placed in the previous pages. My main hypothesis is as follows: *Consensual conflicts are more likely to reach the manifest level than dissensual conflicts. Therefore, one should expect more violence in consensual conflicts than in dissensual ones.* Considering that consensual conflicts have been mostly experienced over the land issue, then according to the above proposition the inevitable result has to be that land conflicts will be the most violent ones. In addition, if one maintains that manifest conflicts have been more experienced in Pará than in Roraima, then it is expected that the level of violence in Pará should be higher than in Roraima. The empirical evidence revealed through

[160] A well-remembered case is when the Kayapó managed to expel 5,000 *garimpeiros* with the help of the Brazilian force in 1985.

this dissertation seems to support the above proposition. The following paragraphs attempt to reinforce this argument.

In part B of chapter V it was stated that the categories of consensual and dissensual conflicts are used as ideal types in order to classify and understand conflict development in Pará and Roraima. Consensual conflicts are those fought basically over tangible things, and dissensual conflicts are the ones associated to values, beliefs, and norms. After considering the cases of Roraima and Pará I have come to the conclusion that both states account for dissensual and consensual conflicts. As I have explained, conflicts in these states range from disputes on specific value-objects such as land, to conflicts on values and beliefs about what and how different things should be done, i.e. exploitation of mineral resources and commercialisation of timber products in indigenous lands.

A general remark is that consensual conflicts have been more notorious in Pará than in Roraima. *What is the explanation for such a difference?* In consensual conflicts, the same commodity, often scarce, is valued by agents. Then it is the dispute over the concrete and scarce commodity that makes the agents enter into conflicts. This is precisely what we witnessed in Pará. In this state, most of the conflicts have been categorised as land conflicts evolving around land ownership. The above signifies a dispute over a particular commodity, in this case property. In addition, some of the mineral conflicts in Pará have been presented as consensual in nature. For instance, the dispute over the possession of Serra Pelada between *garimpeiros* and the CVRD.

In Roraima, on the contrary, social conflicts present a clear combination of consensual and dissensual conflict. In this state social conflicts have not only arisen because of land scarcity, but mostly because of the incompatibility in the desired goal of land use. *Garimpeiros* believe that they have the right to search for gold and diamonds in what they consider unused land, but the Yanomani and their supporters argue that Indian lands should be kept free from external influence. As can be seen, these groups are not confronted with a pure situation of land scarcity, as those between landless and large landowners in Pará, but with one of disagreement on how these groups value the land.

In the following table, I attempt to show the major role that different types of conflict play in each state. Once again it should be mentioned that both types (dissensual and consensual) are ideal types. As previously mentioned, dissensual and consensual conflicts are found in both states, and more importantly in many cases social conflicts in these states represent a combination of consensual and dissensual conflicts. However, it seems that consensual conflicts are more evident in Pará, because, as I have shown, most of the conflicts are related to land ownership and land access. In Roraima most of the conflicts represent a combination of the consensual and dissensual, because besides disputes over land ownership (Macuxi and landowners) we have a large number of open conflicts due to differences over how land is valued by different social groups (Yanomani and *garimpeiros*).

Table 35: Pará and Roraima's main types of conflicts

CONFLICT TYPE	RORAIMA	PARÁ
Dissensual conflicts	**X**	
Consensual conflicts	X	**X**

8.3.3 Conflict typology versus conflict issues

In table No.38 I show that consensual conflicts have been related mostly to the land issue. In fact, as I have shown in chapters VIII and IX and the present one, most land disputes can be linked to the ownership of land, which is clearly a consensual type. The fact that most of

the victims in land conflicts have been *posseiros* and *sem-terra* (see graph No.16) supports the statement about the consensual nature of the land conflicts. This is due to the fact that *posseiros* and *sem-terra* are groups involved in conflicts clearly determined by land possession.

The second type of conflict issue (mining) clearly presents both a consensual and dissensual nature. For instance, in Roraima many of the mining conflicts have not been related to the ownership of the mineral site. However in Pará there are concrete cases of conflicts over the possession of mineral sites such as in Serra Pelada. Roraima and Pará present great similarities in the mineral issue as its accounts for a great part of the state economy. However, there are important differences in the relationship of conflict type-issue. In Roraima it has been more dissensual than in Pará. In Roraima, we basically have *garimpeiros* and Indians, which means high population mobility because *garimpeiros* usually want to exploit the mineral site rather than to own it permanently. The case of Pará has been different due to the role played by corporate activities (mining companies). Consequently, as in the Carajás area, they are interested in real ownership of the mineral site. In short, different actors in the mineral issue also explain differences in the relationship of conflict type-issue.

Finally, conflicts over Indian lands can also be understood in both consensual and dissensual terms. In this case conflicts over land demarcation and land ownership have been accompanied by disputes shaped by beliefs and ideas around the utilisation of Indian lands. For instance, even though land demarcation in Pará has been an important factor of conflict (consensual), this has been accompanied by conflicts on what is desirable in terms of profits from exploitation of mineral resources and logging exploitation on Indian land (dissensual).

Table 36: Relationship between conflict type and conflict issue

Conflict type	Land	Mining	Indian lands
Consensual conflicts	**X**	**X**	**X**
Dissensual conflicts		**X**	**X**

In conclusion, according to the data presented in part 8.3.1, 8.3.2 and 8.3.3, I argue that the proposition stating that consensual conflicts are more likely to end up in violent conflicts can be empirically supported in the Brazilian Amazon. The fact that land conflicts in the Brazilian Amazon are primarily of a consensual nature, and are the most intense of the three types studied here, appears to confirm my proposition.

8.4 On the nature of the agents: Toward an evaluation of the actors' behaviour in Roraima and Pará

Before proceeding into the comparison between agents' behaviour in the state of Roraima and Pará, I would like to stress that agents' behaviour has to be understood within the systemic perspective of this study. I stated in section 8.2 that the development of the sources of social conflict have to be understood within general notions of security and economic interest. In the same way, these two notions also have to be considered when understanding the general pattern of behaviour of the agents operating at international, national and local levels. However, such notions do not mean the same for all the agents. For many they have different meanings depending on whether a given agent operates at an international, national and/or local level. Now, the above does not mean that in some cases security is a primary concern to agents operating at all levels, but that there can be various reasons for such concerns.

For instance, let us consider security interests. It has been said that the notion of security is of paramount importance in understanding Amazonian development. However, this does not mean that all the agents conceptualise security in the same terms. The meaning will depend on the level (international, national, and local) at which agents are operating as well as on the nature of the agents themselves. Thus, international agents (basically NGOs and some industrialised countries) conceptualised security in terms of the potential threat that environmental change in the Amazon represents for the whole world. The issues of climate change and biodiversity loss are central at this level. Therefore, the theme of the international protection of the Amazon has been paramount for these agents. This situation has been described as the potential internationalisation of the Amazon. Agents at a national level also perceive the management of the Amazon as a security issue. However, the motivation in most cases is different. It is true that some national NGOs have the same preoccupations as those operating at an international level. However, national agents such as the military, national politicians and the central government are primarily concerned with the sovereignty issue. A clear example of this perspective is the "our nature" program set out by the government of José Sarney. This "our" connotation clearly reflects the national preoccupation with the management of the Brazilian Amazon by the Brazilians. That is why the interest of national integration has to be understood within this dimension of security at national level. Finally, agents operating at a local level have a more focused opinion of security and a corresponding interest. Thus, security is understood by some local agents as the assertion of authority with the interest of guaranteeing internal order. For instance, federal governments, large landowners and mining companies consider it fundamental to guarantee social stability and order. However, for other local agents, the security preoccupation has a different connotation.

At a local level the case studies of Pará and Roraima show that the meaning of security can be perceived very differently, even though security is a core element for all the local agents. For instance, security is a priority for both large land owners and landless. However, the notion of security in both cases is different. For the former it is associated with maintaining the status quo, meaning the resistance of land invasions and land reforms. In contrast, the *sem-terra* have the notion that security is linked to the possession of land as a mechanism to guarantee a way of living and therefore social peace. The same situation occurs in the case of *garimpeiros* versus Indians. Here, the security of the Indians is seen as avoiding disturbances in the area they occupy, but for *garimpeiros* their security is linked to the right to exploit the deposits that they discover, which are often found on Indian lands.

Finally it is important to argue that these levels are not isolated from each other. On the contrary, they are interconnected and the existence of one depends on the others. Thus, the notion of internationalisation of the Amazon is linked to the sovereignty issue and these two are associated to the notion of the assertion of federal authority in the Amazon and the survival of the local population.

In the following paragraphs I will briefly compare actors that represent conflict-behaviour. In chapter VI and VII the most important actors in the dynamics of social conflicts were identified. It can be induced from those chapters that there is a strong similarity in the actors found in both states. In fact *garimpeiros*, the military, Indians, the Catholic Church, *posseiros*, large owners, and the national and federal governments have participated actively in both states. However, other actors such as the *Movemento dos Sem-Terra* (MST), *grileiros*, the *União Democrática Ruralista* (UDR), logging companies, nut gatherers, and mining companies have mostly operated in Pará. *What factors explain such differences?* Basically the explanation can be found in frontier dynamics. In fact, the existence of large amounts of landless now organised in the MST, the operation of several mining companies, and the increase of logging activities is a direct result of the opening up of Pará. The basic mechanism for this has been road construction and economic incentives.

The main strategies that I will consider in evaluating actors' behaviour in Pará and Roraima are the following:

Confrontation. In Pará conflict behaviour is basically associated with landless, *posseiros, grileiros*, and large landowners. All of them are actors related to the land issue. In Roraima, on the other hand, the main actors involved in social conflicts are Indians, *garimpeiros,* and landowners.

Negotiation: Negotiation has been a core aspect of the dynamics of conflicts in Pará. In this sense several processes of negotiation have taken place. For instance between Indians-*garimpeiros*, Indians-government, *garimpeiros*-government, government-mining companies. In Roraima very little direct negotiation has taken place among the actors. In principle, some levels of negotiation started to develop between the Makuxi population and *garimpeiros* as well as between Makuxi and landowners, but the process has not resulted in any substantial progress due partially to internal divisions within the Makuxi.

Alliances. As in every social conflict actors try to gain support from other groups in order to increase their chances of managing the input coming from the system as well as to give the best response in the way of output. The most important alliances have been between the Catholic Church and the Indians in the case of Roraima, and the Catholic Church and the landless in the case of Pará. In this way the most important allies of the two social groups most involved in social conflicts (Indians in Roraima, landless and *posseiros* in Pará) has been the Catholic Church. In Roraima its activities have been related to supporting the Indians through the *Conselho Indigenista* in their demands for land demarcation and fights against *garimpeiros*. In Pará the Catholic Church has widely supported the landless and *posseiros* through the Pastoral Land Commission in their confrontation with landowners and the state.

Large landowners have managed to become a considerable influence in the federal parliament through the UDR. This has allowed them to make alliances with the government and to a certain extent the military.

The *garimpeiros* occasionally have been involved in alliances with other groups. When this has happened in Roraima and Pará it has been because a political election was in progress. It should be remembered that in the 1980s *garimpeiros* constituted an important electoral base both in Roraima and Pará.

Indians are a very interesting case, because even though they have received support from the Catholic Church I will argue that most of the support has a supra-system character. International organisations and/or national ones outside the Amazon have been the fiercest supporter for their demands.

Finally, the military in my view has had an ambiguous position. I can not argue that they have been from the beginning and continue to be in alliance with one specific group. Although, its position has changed very much in accordance with the circumstances. It is my belief that this sort of adaptation has allowed them to continue to be one of the most important social actors in the whole Amazon even when important changes have taken place in the governmental structure. As an example of this capacity of adaptation their participation in the informal mining sector should be mentioned. For instance, in the case of Serra Pelada they intervened directly through Curió to support *garimpeiros* during a certain period of time. However, in the case of *garimpagen* on the Kayapó land, the army (air force) helped the Kayapó to remove approximately five thousand *garimpeiros.*

To conclude, I argue that even though several actors could be identified in both states, what is common to both is that the *elite* has shaped the state economy of Roraima and Pará. The power of these groups has rested both in the large amount of land owned as well as in the resources contained in them. This has been the situation of the rural *elite* in Pará who have been dedicated to collecting the Brazilian nuts, and later on the oligarchies associated to livestock. In Roraima, the *elite* related to cattle ranching has been the driving political group

since the very beginning. Historically, such *elite* have been important political players in both states. Although, it is normally argued that during the military dictatorship these *elite* lost some power due to the centralisation policy practised by the military regime.

8.5 The importance of the supra-system and system factors to understand current events in Roraima and Pará

The study of Roraima and Pará show the importance of having a systemic view. The systemic and supra-systemic factors are essential for understanding the performance of the independent variables as well as the final outcome of the dependent variable.

As it was shown in chapter V (5.1) multilateral institutions, the neighbouring countries, the industrialised countries and national-international NGOs have influenced variables such as environmental change and allocation of resources at supra-system level. Thus, for instance the multilateral institutions (especially the World Bank) allocated some resources to sponsor activities in the Amazon. According to Domask (1997), between 1948 and 1992 the World Bank had lent approximately $18 billion to Brazil, which is equivalent to nearly 10 % of all Bank loans during the period. Domask adds that the Bank aggressively pursued the promotion of large-scale projects, including highways and dam construction, commercial livestock ranching, and Iron-ore mining in Brazil and world-wide. All of them no doubt contributed directly to environmental damage. Along these lines, the World Bank financed some mega-projects with direct implications for the state of Pará. For instance, it helped to fund the 5,000 kilometres of the Trans-Amazon highway, as well as approved US$300 million to fund part of the Great Carajas Program. In the latter case the contribution of some industrialised countries has also been notable.[161] It should also be remembered that Brazil has entered into a number of global and regional environmental treaties such as the convention on Biodiversity, the 1992 UN framework Convention on Climate Change and the International Tropical Timber Agreement (1995). Each of these treaties has implications for the Brazilian government activities in the Amazon. In the same way the activities developed by the G-7 through the program known as *Pilot Program to Conserve the Brazilian Rain Forest*, has clearly exerted a direct supra-system influence on the current development of the Amazon. The above is supported by the fact that money has been allocated for demarcation of Indian lands, for implementing environmental Zoning, for Park and Reserves, for Scientific Research, for Extractive Reserves, etc. However, as noted by Domask (1997), by 1995 the PP-G7 had approved only $161 million when the expected donation was $1.6 billion over a five-year period. Certainly this level of funding will be an important contribution to the strengthening of environmental research, policy and practice in Brazil, but the total amount is still insignificant. In short, even though the PP-G7 means a supra-system influence over the entire Amazon, it is hard to determine the particular impact of the program in Pará and Roraima.

Other important agents at the supra-system level that have a direct influence on the states of Roraima and Pará are the international NGOs. These agents have been particularly active in the case of Indian policy. One of the most relevant examples is the pressure mounted by *Survival International* to press for the restoration of the old Yanomani reserve in the state of Roraima. Similarly there is the support given to the Kayapó in the state of Pará when they made the decision to oppose the construction of several dams at the Xingú River. In addition,

[161] For details on the participation of multilateral institution of financing projects in the Amazon see, Joseph Domask (1997) "A Holistic System Approach to International Politics and International Relation Theory: A Case Study of Brazil and Amazonia*". Doctoral Dissertation*, submitted to the faculty of the University of Miami in partial fulfilment of the requirements for the degree of Doctor of Philosophy in International Affairs. Coral Gables, Florida. June, 1997.

branches of international NGOs such as the World Wild Fund for Nature (WWF) and Friends of the Earth (FOE) and other NGOs have channelled millions of dollars for overseas development purposes.

It is also clear that the debate over the internationalisation of the Brazilian Amazon has had direct implications on the states of Roraima and Pará. For instance, there is the formulation of the Calha Norte project, which aimed to increase the military presence north of Solimões and Amazonas. As mentioned in chapter VI, Calha Norte was justified by a number of factors. However, it seems that one of the most influential factors was the possibility of the creation of a binational Yanomani Indian park, which would include part of the state of Roraima. These system supra-system interactions explain why environmental matters in the states of Roraima and Pará have been to certain extent militarised. Internally parts of these states (mainly border areas) have been conceptualised as an empty and vulnerable space. Internationally, the Brazilian Amazon, which includes of course Roraima and Pará, is presented as a common heritage of human kind.

An important aspect linked to the above situation (the empty as well as vulnerable space and the perception of common heritage) is the fact that such a view contributes to the implementation of policies aimed at guaranteeing Amazonian incorporation into the national context. This has been perceived in both states. Frontier strategies have been used to assure this, but, as has been mentioned throughout this dissertation, frontier policies find a stronger manifestation in the state of Pará than in Roraima. Supra-system factors have contributed greatly to shape the internal dynamics of the Amazon and states such as Roraima and Pará.

The previous paragraph provides the necessary background to move from the supra-system level to the system level and understand how the internal dynamics of Roraima and Pará are greatly influenced by system factors. It should be mentioned that most of the arguments have already been presented in chapters VI and VII. Here I will just give some examples of such interactions to support my original arguments and the systemic perspective that has been argued throughout this dissertation.

One of the most notorious aspects in which the system dynamic (linked to frontier strategies) explains differences between Roraima and Pará is the development of ranching. As mentioned in chapter VI allocation of resources through fiscal incentives and tax exoneration for cattle ranching were very marginal in Roraima in comparison with Pará. This fact is important in order to understand intra-systemic differences between Pará and Roraima involving the independent variable, environmental change, as well as the dependent variable, social conflict. Thus, for instance the rural violence that has traditionally accompanied ranching in Pará was not experienced to the same degree in Roraima.

Logging, viewed in this dissertation as a source of environmental change, is another activity shaped by supra-systemic and systemic forces. For instance in the case of Roraima, it should be remembered that in the 1970s and early 1980s the economy was based on timber exports to Venezuela.[162] In the case of Pará the recent operation of Asian companies is particularly notable. According to a Parliament Commission that investigated Asian companies operating in the Amazon, three important Malaysian groups are in Brazil: *Samling* that control "Compensados e Laminados S/A" in Pará; the company *Rinbunhan Hijau*, administrating "Madereiras Selvaplac Indústria" and "Comerçio e Maginco Madereira Araguaia" in Pará; and finally *WTK* owner of "Amaplac" (Newspaper *O Globo* March 16, 1998). In its entirety timber production has been growing during the 1990s, particularly in Pará, and with the global supply of hard wood from Southeast Asia and West Africa

[162] For more on this issue see the work *Surviving the cut: Natural forest management in the humid tropics* by N. Johnson and B. Cabarle. World Resources Institute, Washington DC. 1993.

diminishing, the market is set to continue growing. Moreover, according to the Commission and the Secretariat for Strategic Affairs, the foreign companies account to 60 % of the extraction and 93 % of the export (Newspaper *O Globo* March 10, 1998). Despite the above statistics, it has been argued that 80 % of logging is clandestine since it is undertaken by *ex-garimpeiros, posseiros*, Indians, *sem-terra, caboclos* and migrants. For instance, the former IBAMA president Eduardo Martins stated that in 1998 90 % of the wood used in the south-east of Brazil came from the Amazon (Newspaper *O Globo* March 10, 1998).

It is interesting to point out in this section how the two ideas that have always been present in Roraima and Pará (integration and security) have had clearly supra-systemic and systemic motivation. That means that international and national factors in direct and/or indirect ways have influenced the development of these two ideas in the states of Roraima and Pará.

The supra-system and system influence is highly notable in the mining sector. At supra-system level I have already mentioned how the Greater Carajás project located partially in Pará was financed to certain extent by some multilateral institutions. Moreover, several international consortia have been operating mainly in the state of Pará. The exploitation of aluminium in the Trombetas region is a case in point. In general, the corporate emphasis of mining in Pará has provided a link between the local, national and international economy. Here it is important to mention that the rising price of gold at the start of the 1980s sparked gold rushes in Pará and Roraima. However, it is not only supra-system factors that have directly influenced the mining economy in these states, but also system factors that have to be considered. Thus, the increase in informal mining is not only demand-led (i.e. the international market price), but is driven by immediate concerns such as the struggle against poverty in Brazil.

The importance of having a systemic perspective when understanding the current situation in Roraima and Pará can also be observed in the population growth variable. It has been said that a majority of population growth in both states can be attributed to the migration process. For instance, as in the case of land with the frontier policies, many people arrived in southern Pará in particular because small properties were being donated in public colonisation schemes, or sold in private projects. Mining in both Pará and Roraima has provoked a high rate of immigration. The cases of Serra Pelada in Pará and the *garimpagen* in the Yanomani area of Roraima are the most recent examples. One important connection, that is not often perceived and that through the exposition made in chapter VI and VII can be deduced, is that mining in Roraima has altered the pattern of land tenure in Pará. In fact, many of the ranches bought by Roraima's *garimpeiros* are clustered in southern Pará.[163] Following MacMillan's (1995) view, Roraima's *garimpeiros* presumably saw the ranching economy of Pará as an alternative option due to its integrated road network and proximity to the major urban markets of Belém and Brasilia.

8.6 Main findings

This part presents the main findings of this study in close correlation with what was stated in the first chapter of this dissertation, particularly in section 1.3 and 1.4. Therefore, the following findings are strictly related to the research problem as well as to the main research questions formulated at the beginning of this study, which are: *What are the main causes leading the social actors to get involved in a situation of open conflict in the Brazilian Amazon?* And secondly, *at what extent does environmental change contribute to social conflicts in the Brazilian Amazon?*

[163] To see data of ranches in Pará bought by Roraima's garimpeiros see *At the end of the rainbow?* by Gordon MacMillan. 1995

The following findings are an attempt to reinforce my theoretical argumentation and model construction. Thus, it was mentioned in the first chapter that my aim was to explore how in an open system (as the Brazilian Amazon) environmental change can contribute to social conflicts in the Brazilian Amazon when it interacts with other variables, and at the same time showing that the relationship between environmental change and social conflicts can be indirect. As I mentioned in the first chapter these propositions have several implications. First of all, social conflicts in the Brazilian Amazon have to be understood not only as a result of the internal dynamics of the basin, but also as a result of factors and forces operating beyond the borders of the Brazilian Amazon. The above implies the relative importance of the supra-system in explaining system and subsystem behaviour. Secondly, it is clear that environmental change does not act as sole source of social conflicts in the Brazilian Amazon. Thirdly, I argue that environmental change is basically an accelerating factor leading to conflicts because of its negative social and environmental side effects (externalities). Fourthly, it could be seen how frontier dynamics are a vital element in shaping the *dynamics* of the system. This means that the former is capable of producing differences in the performance of the independent variables, therefore influencing the final outcome of the dependent variable.

The following findings reflect the above consideration stated in the first chapter of this dissertation.

1. When applying the indirect method of difference (presence-presence) at the subsystem level, environmental change and allocation of resources seem to be the two independent variables with more influence in the dynamics of open conflicts.

As conflicts in the Brazilian Amazon, and consequently in Pará and Roraima, have plural causation, I use the method of paired comparison to determine the importance of each variable. Thus, to support this first finding I made a cross-tabulation of independent and dependent variables in comparative terms between Pará and Roraima (see table No.37).

As it was stated in this chapter, the four independent variables are found in Roraima and Pará. However the cross-tabulation in table No.37 tells us that there are two variables with very different outcomes in these states (environmental change and allocation of resources). It could be argue that the other three variables are similar, even though the outcome is not the same for both states. Now, in terms of the dependent variable, the general outcome tells us that there is an enormous difference between Pará and Roraima. According to the data mentioned in this chapter, during the period being compared, Pará accounted for nearly 200 victims in land, mining, and conflicts on Indian lands, while Roraima accounted only for 51. These numbers have to be looked at in some detail, because there are important differences in terms of the whole population between Roraima and Pará. Nevertheless, in relative terms such differences, although still important, are not enormous. Thus, the population density in 1996 per square kilometre was 1.07 in Roraima and 5.0 in Pará. In addition, as I indicated in this chapter, population growth during the 1980s has been higher in Roraima than in Pará.

Thus, if I apply the logic *presence-presence* for the case studies allocation and environmental change are the most substantive independent variables influencing the dynamics of social conflicts. In the case of Pará, environmental change and allocation of resources are variables that score high. In Roraima in contrast they score low. At the same time the number of manifest conflicts in Roraima is far inferior in comparison with Pará. Finally, I want to make clear that it is not that environmental change, allocation of resources for frontier development, and social conflicts do not occur in Roraima, but on the contrary they do, only their outcome is considerably less significant.

A notable fact is that conflicts continue in the absence of fiscal and economic incentives. It should be remembered that most incentives in the Brazilian Amazon were suspended at the

end of the 1980s. The fact that explains the continuation of social conflicts is that even in the absence of such incentives there is an economic, social and environmental situation that continued to be strongly influenced by these incentives. In addition, macro-economic factors such as unemployment are pushing large contingents of people to frontier areas and into new economic activities such as gold mining. Consequently, one could not expect a noticeable decrease in the social conflicts just because the allocation variable has a different score. Moreover, there are other important macro-economic factors that should be considered such as inflation, external debt, and land values.

A correspondence can be seen between inflation and land values. Thus, extremely high rate of inflation in the 1980s induced the urban bourgeoisie from the southern states to buy land in the Amazon in order to speculate and protect their capital. The value of land in the Amazon has been steadily increasing. Moreover, as there were practically no taxes on land, and real interest rates were low or negative, land speculation became extremely attractive.

Concerning external debts since the mid-1970, the government decided that the Amazon should contribute greatly in order to solve the country's problems of scarce foreign exchange. As a result export-oriented mining projects and some livestock projects became a government priority. In most cases the result of these projects has been a reduction of the forest cover.

Table 37: Sources of social conflict in the state of Pará and Roraima

SOURCES	RORAIMA	PARÁ
Environmental change		**X**
Allocation of resources		**X**
Distribution of land	**X**	**X**
Population growth	**X**	**X**

In conclusion, it seems reasonable to begin explaining regional differences between Roraima and Pará by using the independent variables environmental change and allocation of resources. However, one can certainly not attribute the total causality of the differences between Roraima and Pará to environmental change and misallocation.

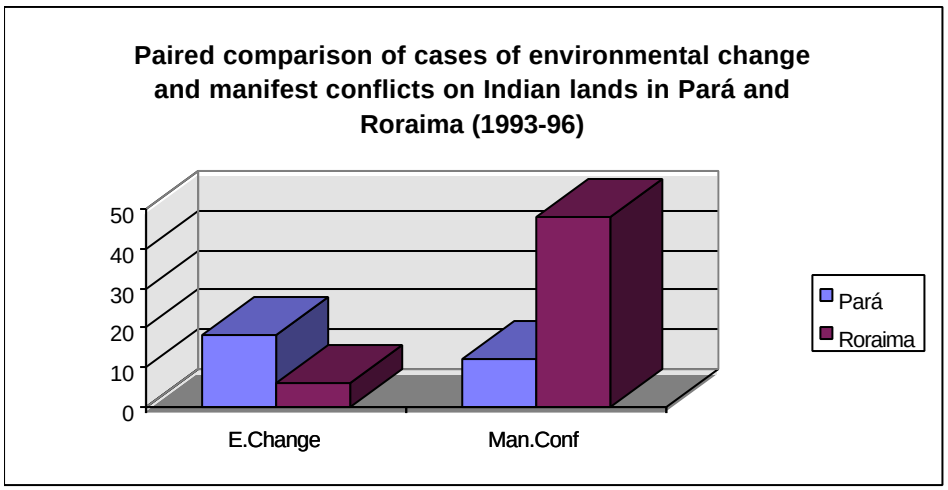
2. Even though the first finding shows that environmental change and allocation of resources are the independent variables that most influence the total outcome of the dependent variable, they do not operate in isolation. Thus, the total value of manifest conflicts at subsystem level is determined by the interplay of all the independent variables in time and space.

To support the above finding I have developed a paired comparison to reject single-factor explanation. In this sense I use the particular case of conflicts over Indian lands in Pará and Roraima. Thus, after the first finding it could be assumed that environmental change in isolation contributes significantly to social conflicts in these states. However, using data from the same period of time (1993-96) I wanted to show how the indigenous areas in Pará suffered more environmental disruption than Roraima (see graph No.19). Nevertheless, Roraima accounted for more cases of manifest conflicts during the same period. Thus, applying the logic *presence-presence* one would expect to see more manifest conflicts in Pará than in Roraima, but the opposite occurred.

In the following graph the category of environmental disruption includes the cases of deforestation, pollution from mining, and overfishing caused by invasions of Indian lands.

The data shows that 18 cases of environmental change were detected on Indian lands in Pará and only 6 cases in Roraima during these years. However, during the same period of time 48 cases of manifest conflicts were detected in Roraima and only 12 in Pará.[164]

Graph 19: Paired comparison of cases of environmental change and manifest conflicts on Indian lands in Roraima and Pará (1993-96)



Source: CIMI Annual report (1993, 1994, 1995, 1996), and INPE (1998)

The fact that Roraima has a higher rate of conflicts on Indian lands even with lower numbers of environmental disruption only indicates that seeing environmental change in isolation from other variables could give a wrong impression of the whole picture. Therefore, it is the combination of independent variables that could better explain the total value of the dependent variable. The above is important because at the beginning of this dissertation I criticised the "atomistic" view, as well as certain tendencies to formulate problems in a deterministic way, such as the *scarcity violent conflict* model by Thomas Homer-Dixon. In the specific case of conflict over Indian lands the differences seem to be related to unsolved inter-group hostility. In fact, most of the murders in Roraima are related to the conflicts between *garimpeiros* and indigenous people, especially Yanomani and Makuxi. However, in Pará as I have shown, the Kayapó and other groups have managed to negotiate with invaders, a situation not experienced in Roraima. In addition, it has been reported lately that logging entrepreneurs (*madereiros*) have employed Indians in Pará for illegal logging, which signifies a tacit accord between these groups. The above situation could explain why even though environmental change on indigenous lands in Pará rates higher than in Roraima, it has not resulted in higher numbers of manifest conflicts.

3. At a system level (Brazilian Amazon) the conceptualisation of Pará and Roraima has been different. Pará was conceived above all as a frontier resource area and Roraima as a security area.

[164] Following the definition of environmental change used in this dissertation, the cases registered in the last years are as follows: firstly, in the case of water contamination by mercury Pará had reported two and Roraima one by 1994, in 1995 one in Pará and two in Roraima, finally in 1996 four were reported in Pará and one in Roraima. Secondly, in the variable deforestation it is possible to note a slight difference. In Pará ten cases have been reported compared to one in Roraima. This is basically the result of illegal logging in indigenous lands.

In fact, if one takes a look at Pará one can observe that over the last 40 years successive governments have sought to extend their influence in Pará through the building of infrastructure and the allocation of resources. Throughout chapters V, VI, and VII the enormous differences in the allocation of resources and infrastructure between Pará and Roraima were shown. Roraima is a different case, because this territory was basically seen as a national security area since the Brazilian constitution of 1937. The constitution of 1937 allowed the Brazilian State to create federal territories for security reasons. That is one of the reasons why the state of Roraima was created in 1943. The conceptualisation of Roraima as a security area can also be noted in the fact that during the military dictatorship the administration of the federal territory was delegated to the army, as well as many of the state governors in Roraima have had positions in the army. From 1943 to 1985 a total of 14 state governors were affiliated with the army.[165]

4. Frontier development has been the driving force of the system dynamics. Therefore, it became the main contributor to subsystem differences by influencing the values of the four independent variables, and consequently through that situation influencing social conflicts.

The frontier development is a starting point for explaining why Roraima and Pará display great differences in some independent variables such as environmental change and allocation of resources, as well as in the number of manifest conflicts. I argue that the conception of development, put into effect in the second half of this century, explains variations in the process of environmental disruption and allocation in Pará and Roraima. Thus, the pattern of development implemented in the Brazilian Amazon determined that Pará was placed into the frontier dynamics, while Roraima in many ways stayed out of the frontier. It should be added that the main characteristic of the frontier dynamics was the allocation of resources to integrate the Amazon basin into the national economy.

A dynamic frontier economy did not arise in Roraima. Only the gold rush brought some frontier development. Instead, the region's primary source of income was linked to its role as an artificially created geo-political pole marking Brazil's international boundaries. Therefore, the region did not pass through the dynamics of a resource-extraction phase, as did Pará. Moreover, the pioneer agriculture has been insignificant. Until recently, cattle ranching, the state's most important economic activity, could not be classified as a capitalist occupation stage, and the ranchers of Roraima are not involved in a purely money-oriented economy as is normally the case in Pará.

5. The context of environmental change is conflictive, not because of environmental change itself, but because it follows the systemic principle that everything is connected to everything.

The process of environmental change shows that natural factors are not entirely separated from social factors. Through the environmental side effects the clear relationship between natural and social factors can be perceived, as well as the dependency of structure and function within the system. Clearly, food supply and shelter (function) depend strongly on forest, water, and soil (structure). In fact, knowing that food and shelter are two of the most important social needs, social conflicts can be expected when these social needs are not met. Thus, taking into consideration the above idea, I conclude that the web linking environmental change to social conflicts in Roraima and Pará experiences the following phases:

Phase I: Environmental change

Deforestation

[165] Data taken from Gordon MacMillan "*At the End of the Rainbow? Gold, Land and People in the Brazilian Amazo*n" Earthscan publications. 1995.

Pollution from mining

Floods caused by hydroelectric projects

Phase II: Side effects

Economic disruption

Population displacement

Ecological marginalisation

Phase III: Conflict issues

Land conflicts

Mineral conflicts

Conflict over Indian lands

Phase IV: Conflict types

Consensual conflicts

Dissensual conflicts

6. Environmental change has never contributed to manifest conflicts in Roraima and Pará as a sole source, and rarely as a direct source. Instead, it has contributed through side effects, the most important of which have been disruption of economic activities and population displacement.

Environmental change has generated several interrelated social effects that in many cases ended in social conflicts. The contribution of environmental change to manifest conflicts in Roraima and Pará could be explained in terms of the externalities produced by the process of environmental change and this has to be linked necessarily to the pattern of development followed in Pará and Roraima. The side effects pointed out are closely related as will be determined in the following explanation of this finding.

The most important side effect of environmental change has been population displacement. In Pará, the main sources of environmental change (agropastoral expansion, mining activities, logging and hydroelectric projects) have increased pressure on people, particularly on the local population. The relocation of people because of the spatial impacts of these projects has made these people themselves become agents of further project-triggered effects by displacing one another. In the case of Pará, it is clear how different social groups compete with one another in their struggle to gain a living in frontier areas where unclaimed lands are increasingly in short supply. In addition, environmental change has contributed to population displacement and, therefore, to a high number of conflicts due to the fact that a large sector of the population coming into the area suddenly found itself excluded from the economic model. The exclusion occurred either because the soil was not good enough to support agriculture at a commercial and/or subsistence level, or because the soil had already been degraded by previous deforestation. It should be remembered that, with the high deforestation in southern Pará, erosions starting to be a serious problem and the nutrient stocks usually declined as a result. The above problems have provoked an acute process of environmental change because

small farmers and colonists have to keep moving on in the frontier dynamics resulting in further deforestation.

A second important side effect has been disruption of economic activities based on the utilisation of natural resources. In fact, this side effect could be linked to potential manifest conflicts, as can be observed in the negative effects on the traditional shifting agriculture. This kind of agriculture, which is fundamental to the native population, requires regeneration of secondary growth, which is modified when large tracts of forest are cleared and converted to pasture. Thus, once the basis for the practise of shifting agriculture has been disrupted, the population living from this system see their opportunities in developing this type of agriculture reduced. Moreover, the impact of environmental change on traditional floodplain agriculture, inland fisheries, and forest productivity has provoked serious disruptions affecting populations such as: indigenous and riverine populations who have practised *várzea* (floodplains) agriculture for many years.

An important economic activity that has been disrupted because of environmental change is fishing. Rivers have suffered from the pollution from mining, which affects fishing activities of the Indian communities. In addition, in places such as southern Pará violent conflicts have been registered between traditional fishermen and commercial fishermen. The construction of dams is also changing the migration pattern of many Amazonian fish. Finally, the deforestation of food plain forest also contributes to the decrease in fish stocks, because many species feed on tropical fruits and seeds. All these aspects mean that riverine populations suffer serious constraints in their incomes and job opportunities, creating serious social stress.

Another population affected has been the extractivists in Pará (e.g. rubber tapers and nut collectors), because deforestation has reduced and/or eliminated the production of Brazil nuts, natural rubber, natural oil and timber. In this area the expansion of cattle ranching, logging activities and projects such as Greater Carajás Project, along with the commercialisation of timber have induced the destruction of areas of rubber trees for pasture and charcoal.

In short, the side effects induced by the process of environmental change in Pará include a drastic process of population movement and economic decline for the native population, with a clear influence on the dynamics of manifest conflicts. Thus, not surprisingly, the two above-mentioned side effects of the process of environmental change (population displacement and economic disruption) can be perceived more clearly southern Pará, an area with the most reported open conflicts.

7. Roraima shows that even in cases of strong dependence on natural resources, open conflicts could arise not only because of a scarcity of resources, but because of the incompatibility of different social structures characteristic of different patterns of resource use.

In Roraima, conflicts clearly do not emerge because of scarcity of natural resources, but rather because the spatial demands of Indians such as Yanomani and Makuxi have conflicted with the demands of other social groups such as *garimpeiros* and landowners. Considering that there is normally a correlation between social structure and productive structure, one could expect social conflict if the productive structure is conflictive, for instance mining in Roraima. As such, the accommodation of interests in Roraima has been very difficult due to the incompatibility of the social structure of Indians, *garimpeiros* and landowners. This is partially because the way in which those groups relate to each other depends largely on the relationship that is established between their productive activities. This incompatibility is reflected in different patterns of resource use among these groups. In short, it is not surprising that social conflicts in Roraima break out when a physical space as the Indian lands has been utilised in various ways, serving different social groups and their production activities.

8. Most social conflicts in the Brazilian Amazon can be placed in the category of consensual conflicts, and such consensual conflicts have been more notorious in Pará than in Roraima.

What is the explanation for such a difference? In consensual conflicts, agents value the same commodity, which normally is scarce. Thus, the dispute over a certain scarce commodity is what makes the agents enter into conflicts. This is precisely what we witnessed in Pará. In this state, most of the conflicts have been categorised as land conflicts revolving around land ownership. The above signifies a dispute over a very definite commodity, property In addition, some of the mineral conflicts in Pará have been presented as consensual in nature. For instance, the dispute between garimpeiros and the CVRD over the possession of Serra Pelada.

In Roraima, on the contrary, social conflicts present a clear combination of consensual and dissensual conflict. In this state social conflicts have not only arisen because of land scarcity, but primarily because of the incompatibility in the desired goal of land use. *Garimpeiros* believe that they have the right to search for gold and diamonds in what they consider unused land, but the Yanomani and their supporters argue that Indian lands should be kept free from external influence. As can be seen, these groups are not confronted with a situation of scarcity, as between landless and large landowners in Pará, but with a situation of disagreement on how these groups value the land.

In the following table I will attempt to show only the major role played by one or another type of conflict in each state. It should be said once again that both types (dissensual and consensual) are ideal types. As I said dissensual and consensual conflicts are found in both states, and more important in many cases social conflicts in these states represent a combination of consensual and dissensual conflicts. However, it seems that consensual conflicts are more evident in Pará because, as I have shown most of the conflicts are related to land ownership and land access. In Roraima most of the conflicts represent a combination of the consensual and dissensual, because besides disputes over land ownership (Macuxi and landowners) we have a large number of open conflicts due to differences over how land is valued by different social groups (Yanomani and *garimpeiros*).

Chapter IX. Conclusions and final reflections

In this last chapter I will attempt to place some of the research findings and propositions into the research framework developed in chapters I, II and III. Thus, the first three chapters focus on the propositions (9.1), the environmental and security debate (9.2), and the environment and conflict approach (9.3). This discussion is followed by the presentation of a broad area (9.4) on which future studies could focus. This chapter and the dissertation as a whole will be concluded with a final remark on the meta-theoretical perspective that has been adopted in this study. This is necessary for the integration of the two most important phenomena in contemporary Amazonia, environmental change and social conflicts, into one structure of analysis, and determined by means of a systemic perspective.

9.1 Discussing propositions, research framework and findings

9.1.1. On the propositions

The main propositions presented in Part A were the following:

8. *The dynamic of the Brazilian Amazon is the result of the continuous interactions between system and suprasystem factors. These interactions explain why environmental matters have been politicised and to a certain extent militarised in the Brazilian Amazon.*
9. *In the Brazilian Amazon no single variable by itself can explain social conflict. Therefore, a simple hypothesis linking environmental disturbance to social conflicts, has to be revised.*
10. *Social conflicts in the Brazilian Amazon are mainly a product of two system constraints: misallocation of resources and skewed land distribution. Environmental change in most cases is not a direct source of social conflicts, but an important aggravator factor of conflicts acting through its side-effects.*
11. *Disruption of economic activities and population displacement are the two most important side-effects of the process of environmental change in the Brazilian Amazon.*
12. *In the Brazilian Amazon environmental scarcity in most situations is not the leading factor producing social conflicts. Therefore, a hypothesis like the greater the natural resources available to the system, the less likely conflicts are among its components, has to be revised.*
13. *Social conflicts in the Brazilian Amazon are related more to consensual conflicts than to dissensual conflicts. However, in most situations a combination of consensual and dissensual conflicts exist.*
14. *Differences in the outcome (social conflict) at the subsystem level (Roraima and Pará) are explained by how the frontier dynamic has influenced the performance of intervening variables such as allocation of resources, distribution of land, environmental change, and population growth.*

9.1.2 System and suprasytem

The first important conclusion deduced from the analysis presented in chapters I and III and reflected in the empirical findings is that it is imperative to study the system by its relation to the suprasystem. In an open system such as the Amazon these interactions are particularly relevant for the understanding of current events. In fact, we have learned that the understanding of the dynamics of environmental change, security and conflicts in the

Brazilian Amazon should recognise the web linking the subnational, national and international level. Actors' behaviour at the international level have notoriously strong impacts on the system and subsystem level. At the same time considering that one of the main attributes of any open system is its adaptability, the Brazilian Amazon generates a series of important request or petitions (output) to the suprasystem. Its adaptability depends on the way the Brazilian Amazon responds to the input coming from the suprasytem. The discussion presented in chapter V shows that adaptability dynamic. The system-suprasystem relationship in the Brazilian Amazon goes both ways, so there are important influxes from the suprasytems to the system as well as from the system to the suprasystem. This dynamic of continuous input and output is a main attribute of the Brazilian Amazon. It represents a core element in understanding what I called in the first chapter the two most important features of current Amazonia, environmental change and social conflicts, and therefore justifies using a systemic perspective of analysis in this study.

The empirical findings have shown that even though we deal with case studies at the subnational level, the system-suprasystem interactions are vital when explaining the subsystem's behaviour. Concerning influences running from the suprasytem to the system, we saw in chapter V how multilateral institutions, developed countries and some international NGOs were influencing the management of the Brazilian Amazon. Most of these influences are related to the protection of the Amazonian forest, indigenous communities and the idea of establishing Amazonia as a global common (even though it is a shared natural resource), based on the argument that the Amazon is crucial for the global environment. At the same time the influences also run in the opposite direction, from the system to the suprasystem. This is due to the transboundary externalities of the process of environmental change. Therefore, the issue of Amazonian management is an international political one, whether or not the Brazilian government chooses to view it as such. For instance, at an international level the management of the basin has implications for climate change and the maintenance of biodiversity. These global issues are the primary grounds on which the international community bases its claims on the management and preservation of the Brazilian rainforest.

Amazonian deforestation generally is not the primary source of global warming, but is a contributing factor. However, as indicated by Domask (1997), the Amazon may be an even more important ecosystem for its potential contribution in resolving the global warming trend than by its contribution to exacerbating this trend. In terms of biodiversity loss, the implications running from the system to the suprasystems are also notorious. Brazil has more than 56,000 different plants (22 % of the total number of species of the planet) already classified by species and types, 3,850 of which only exist in that country (Dreifuss: 2000, p.225). Thus, Brazil is the country with the largest number of living species on Earth, hence the clear implication of biodiversity loss for the whole world.

An important consequence of the system-suprasystem interactions is the *increasing participation of new agents at all levels when it comes to the management of the basin*. However, as the empirical data has shown, the emergence of other important agents does not imply the eclipse of the Brazilian State as an agent. Rather the scope of action of the Brazilian State has been constricted. One main reason is that the management of the Brazilian Amazon is perceived as a national, regional and global responsibility. As a result, the Brazilian State has been limited in its capacity to solve environmental problems. This was evident in 1998 when the state of Roraima was facing huge forest-fires.

In summary, the analyst should be careful to incorporate in the analysis agents and factors at the subnational and international levels. Otherwise the study will go back to a state-centric approach.

9.2 Environment and security

After discussing the environmental security approach in chapter II, and the empirical analysis on the relationship between environmental change and security in the Brazilian Amazon, it can be concluded that future studies should distinguish between the politicisation, militarisation and securitisation of environmental issues. When applied to the theoretical framework, the empirical findings demonstrate the need for a better conceptualisation of the relationship between environmental factors, security and conflict. Thus, in terms of the empirical data and the findings presented in this study my argument is that *in the Brazilian Amazon environmental issues has been politicised and to a certain extent militarised. In addition, in the Brazilian Amazon security has become a comprehensive concept, but it can not be argued that the environmental sector has been fully securitised.*

9.2.1 The politicisation of the environment

I argue that environmental issues have been politicised because there is a strong relationship between public spending, infrastructure development and environmental policies in the Brazilian Amazon. In the words of Buzan, Wæver and de Wilde (1998), an issue is politicised when that issue becomes part of public policy, requiring government decision and resource allocation. In the Brazilian Amazon such processes can be easily perceived. In fact, as we saw in chapter III, Brazilian governments since Getulio Vargas have dedicated great effort to oversee the development of the Amazon. Thus, several state agencies have been created to deal with the Amazon, large amounts of resources have been allocated, and big-scale projects have been undertaken. Concrete examples of such dynamics are the creation of state agencies such as the Bank of Amazonia (BASA), the Northern Brazil Electricity Board (ELECTRONORTE), the National Indian Foundation (FUNAI) and the Ministry of the Environment, Water Resources and Legal Amazon (MMA). In addition, large amounts of resources have been allocated through the Superintendency for the Development of the Amazon (SUDAM), and the Investment Fund for Amazônia (FINAM).

9.2.2 The militarisation of environmental issues

My second argument is that in the Brazilian Amazon *environmental issues have been militarised*. An issue is militarised to the extent that the issue is part of the ordinary tasks and/or duties carried out by the military apparatus, whether or not emergency actions have been taken to face a given threat. In fact, the Amazon has been a focus of concern for the armed forces. For instance, the most important agency for Amazonian development (SUDAM) is a direct product of the military regime. SUDAM represents the conceptualisation of the Amazon as a space to be integrated into the national economy. In addition, such military involvement can be seen in the fact that in most of the agencies dealing with the management of the Amazon there is some military involvement. A case in point is The National Indian Foundation where several of its presidents have come from the army apparatus. It is clear that the military apparatus has always been involved in the establishment and conception of environmental and indigenous policies in the Amazon.

A brief historical synopsis shows that the National Security Council (CSN) in 1985 took upon itself (officially in 1987) the process of demarcation of Indian lands. In 1988, for instance, the CSN took charge of the Project for the Protection of the Environment and the Indigenous Communities (PMACI). In recent years the Indian Missionary Council (CIMI) has been denouncing military intervention on Indian lands. For instance, The Indian Council of Roraima (CIR) denounced in 1993 that the Army has assumed exclusive powers over the Raposa/Serra do Sol Indian Area. The Raposa/Serra do Sol area, on the Brazil-Venezuela border, has had its demarcation process stopped due to political and military pressures. The

main concern by the army seems to be that the demarcation would put the sovereignty of Brazil at risk, because the Macuxi, Ingariko, Wapixana, and Taurepang Indians could claim their independence.

The militarisation of the environment is also related to other issues such as land and mining. In this study I have shown that the land issue has been a key element in terms of designing Amazonian policy. Therefore, the active military involvement in land conflicts is illustrated with the creation of the *Grupo Executivo de Terras de Araguais-Tocantins* (GETAT). A recent example is found in the direct intervention of the army in Parauapebas, Pará. In April-May 1998, 500 soldiers under the leadership of General Antonio de Sã Rocha took control of the area to deal with land conflicts and the general social unrest of the area (*O Liberal*, April 1, 1998).

Finally, all the most important projects in the Amazon have experienced military involvement, even when they were not carried out during the military regime. A case in point was the Calha Norte project formulated during Sarney's administration. Cahla Norte was seen as protecting Amazonian resources and strengthening security in border areas. Moreover, the Secretariat for Strategic Affairs (SAE) has been involved in designing and implementing environmental policies in the Amazon. Lately it has been co-ordinating the Ecological-Economic Zoning. The most recent example of military intervention is the participation of SAE in the Surveillance System of the Amazon region (SIVAM). All the above examples make evident the extensive military involvement in the management of the Brazilian Amazon.

9.2.3 Toward a comprehensive concept of security in the Amazon

As a summary of the above I argue that in the Brazilian Amazon security has become a comprehensive concept. The Brazilian case shows that is not only in developed states that we witness a process of decreasing military threats, but also in developing countries. Brazil has borders with all the other South American countries (with the exception of Ecuador and Chile), yet the Brazilian concerns are certainly less related to the potential problems with other countries in the border regions or the potential invasion from a neighbouring country. This does not mean, however, that the borders are not relevant for security matters. It is evident that in the Amazon region borders are still a reference point in military terms mainly because they are perceived by the Brazilian army as being vulnerable areas, because of low population. For instance, Tabatinga with only 28,000 inhabitants is the most important town on the Colombian border.

In the last years however, there have been a large number of declarations from army officials that confirm the fact that in the Brazilian Amazon security has become a comprehensive concept. Thus, according to the Secretariat for Strategic Affairs (1997) the targets to be reached by 2020 are the full and sustainable utilisation of national territory and maritime space. The Secretariat for Strategic Affairs' view is that contemporary geopolitical thinking focuses upon the necessary political and scientific definition of realistic parameters for sustainable development of both the Amazonian border and region. The issues included in this comprehensive concept are very much in the line of new threats. These issues are basically environmental protection, drug trafficking control, halting the smuggling of timber, rare minerals and biodiversity, controlling and supervising the use of land, fighting forest fires and illegal mining, surveillance and border control, etc.[166] In summary, large amount of resources allocated by the government to the Amazon are presently used to mitigate the impact or threats such as the drug traffic, land conflicts, and environmental disruption.

[166] A full list of these new issues is mentioned by Dreifuss "Strategic Perceptions and Frontier Policies in Brazil". In Anthony Hall ed. *Amazonia at the Crossroads*. University of London, 2000.

The above shows that military threats in the Brazilian Amazon are now no longer seen as the only and most important ones. Military and political experiences in the region have highlighted the reality of the Amazon as one of the most sensitive areas of Brazil, leading to the understanding that its defence cannot be reduced to military dimensions. As pointed out by General Gleuber Vieira (currently chief office of the Brazilian army) it is in this context that the armed forces see themselves as having an additional target, or mission, "co-operating with socio-economic development" (Cited by Dreifuss: 2000, p.213). Taking as an example the development of Surveillance System of the Amazon region (SIVAM), it is possible to see that there is an important shift in the perception of threats. In fact, SIVAM concentrates on the so-called "new" types of threats such as environmental change (deforestation, fires), identification of illegal activities (drug trafficking and gold smuggling) and land conflicts (land occupation and usage). The fact that SIVAM is a project integrated under the Secretariat for Strategic Affairs (SAE) shows how there is a widening in the perception of threats by the Brazilian states.

9.2.4 The securitisation approach

As a final contribution I would like to relate the situation in the Brazilian Amazon to the securitisation approach developed by Buzan, Wæver and de Wilde (1998). First of all, I should make clear that the securitisation approach has not been the primary focus of attention in this study, therefore my assessment here is more a general observation developed from the above argumentation on politicisation, militarisation and the adoption of a comprehensive concept of security in the Amazon. Thus, my assessment is *that in the Brazilian Amazon the environmental sector has not been fully securitised.* To clarify this aspect let us consider the following aspects. The securitisation of the environmental sector basically requires the recognition of existential threats and the need to take extraordinary measures. In the work developed by Buzan, Wæver and de Wilde it is also argued that an issue is securitised only if and when the audience accepts it as such. However, I will concentrate briefly on the first two factors.

The essential question here is whether there is a significant threat requiring emergency action. Certainly it can be argued that in the Amazon basin there are some environmental threats that can be called existential threats, such as the effects derived from dam building (Tucuruí and Balbina), deforestation (southern Pará) and pollution of some rivers due to mercury contamination (Madeira). However, the question is whether such environmental threats have involved emergency actions. Arguably, emergency actions have been required, but in most cases they have not been taken. Evidently, these environmental threats have caused the participation of State agencies including the military apparatus, but in practical terms no emergency response can be perceived. If extraordinary measures imply the use of force to handle the existential threats then one can argue that by looking at the empirical evidence the environment itself has not been fully securitised. What has happened is that the mining and land sector has in fact experienced actions outside the normal bounds of political procedures, meaning in several cases there is the use of force. In most of these cases the environment has been involved in one or another way, but it can not be argued that it is the environment itself that has been securitised.

For instance, the beginning of the 1970s showed the incapacity of bureaucratic procedures to resolve the land dispute and to diminish the number of deaths resulting from land disputes in some areas of particular violence such as Araguaia and the Tocantins river in southern Pará. This area was at the same experiencing a high level of environmental change. Thus, in a clear attempt to control the land issue in 1979 President Figueiredo asked the National Security Council to evaluate the social conflicts taking place in this region. As a result of such evaluation the Executive Group for Araguaia-Tocantins Lands (GETAT) was established.

GETAT was an entity with special power to handle by then an existential threat, which according to the Brazilian government justified actions outside the normal bounds of political procedures.

What is clear in the Brazilian Amazon is that environmental threats do not have institutions that can deal with them, so in a way they are still handled by the military apparatus (militarisation). Even more important is the fact that the Brazilian State and certainly the Army would want to avoid classifying some environmental problems as threats. Some scholars might argue that by securitising the environment the army could control environmental policies due to the fact that the army is currently perceived as the only securitising agent. However, in the Brazilian Amazon the opposite might in fact occur. Because of the regional and global significance of the Amazon, emergency actions at the international level could be justified. Of course the question here is who is going to take the required emergency actions.

An interesting event reflecting the previously described situation occurred in 1998, when the Brazilian Army rejected assistance from the United Nations to combat the fires in Roraima, arguing that they could handle the problem themselves. Obviously they were concerned that the international community could take this as an example of the incapability of the Brazilian State to deal with these new threats, and use this as a pretext for arguing that emergency actions were required, involving new agents. If so, this could lead to the emergence of a new entity providing environmental security in the Amazon, therefore jeopardising the position of the Brazilian Army as the only securitising actor. Hence, the position of the Brazilian Army has to be understood within that context. In fact, it is very unlikely that the Brazilian Army is willing to risk its paramount position in the Amazon for transferring part of its current duties (meaning power) to a new institution.

9.3 Environment and conflict theory

9.3.1 Resource scarcity versus resource abundance

As I have explained in chapter II, the environment conflict approach has proved that in certain circumstances there is a connection between environmental factors and the emergence of violent conflicts. However, when linking the empirical findings to the research framework this dissertation suggests paying attention to several aspects. The first one is related to the definition of environmental conflicts as conflicts caused by environmental scarcity. After the empirical evidence provided in this study this definition appears to be very restricted. Hence, a definition of environmental conflicts should be more comprehensive.

To be more specific the findings provided by the case study of Roraima show that conflicts could also emerge in the situation of resource abundance. *How do we explain this?* The Amazon shows that conflict occurs when one party's claim to or use of one given good negatively affect the interests of some other party, and when no alternative seems to exist that will satisfy the aspirations of the parties involved in the divergence of interests or values. This kind of situation may occur because there simply is not enough of the good to meet the basic needs of the parties involved (basic scarcity), or as in Roraima when ample supply of valuable goods induces competition over access to or use of that good. This latter typology explains the conflicts between indigenous population and *garimpeiros* in Roraima, where most conflicts are not generated by a strong pattern of scarcity, but rather by the richness of the subsoil.

When such conflicts exist, it seems especially severe if one or all the parties have rigid aspirations that they regard as legitimate and when the object in dispute has a high market or user value for the parties involved. This is the case of conflict over mineral resources in Indian lands. Here Indian groups defend the right to use and control their land, which they

regard as legitimated, and yet in addition the mineral resources from this region have an extremely high market value for the *garimpeiros*.

In summary, the emergence of conflicts in the Amazon as a whole could depend more on access to resources, and its intensity could be more related to market's value and user's value of that resource than to environmental scarcity itself. As the case of Roraima has shown, the abundance-scarcity debate and its influence on conflict formation is linked to access possibility of interested parties. This has materialised through the invasion of Indian lands by small gold prospectors and the consequent conflict of interest in terms of the exploitation of gold and other minerals. Good examples are the Yanomani reserve and the Raposa Serra-do Sol area. Thus, conflicts do emerge because the claim made by one party such as *garimpeiros* to use or exploit one given good, such as gold, must negatively affect the interests of some other party, in the case of Roraima the Yanomani and Makuxi. As can be seen, the above does not necessarily mean having a situation in Roraima where the goods or services provided by the environment are not enough for those who want or need it. Rather it means having a situation in which the richness of the subsoil and the environmental change produced by the exploitation of such resources negatively affect one party, this being aggravated by rigid aspiration of both parties and the market's value of the good in question.

Finally, it is important to distinguish the role of scarcity at different levels. While one can argue that in the Amazon as a whole there is not environmental scarcity, yet at a local level the situation is often very different. For instance, there are several scenarios where scarcity is evident, notably in the southern part of the Amazon. Indeed, as presented in chapter V, VI and VII, the southern part of the state of Pará, the eastern border of Pará with Maranhâo, the north part of the state of Tocantins, and a great part of Rondônia present several scarcity scenarios. However, other parts of the Brazilian Amazon such as the northern part of the Amazon (states of Roraima and Amapá) face a very low level of environmental disruption and almost no scarcity in terms of forest, water, and other natural resources. Therefore, it is important to be aware of the problem of scale when analysing scarcity.

Taking into account the above mentioned limitation, I have stated in chapter III that environmental conflicts are *manifest (open) conflicts induced by the process of environmental change*. Thus, the question is whether that by confronting the above definition of the case studies it is possible to talk in fact of environmental conflict in the Brazilian Amazon. The case studies seem to support the existence of environmental conflicts according to the definition presented in this study. The affirmation that environmental change induces manifest conflicts has one important implication. This is that there is an important interplay of environmental change with other independent variables, which explains the emergence of open conflicts. The geographical coincidence of high level of deforestation and large resource allocation has already been explained. For instance, most of the deforestation is concentrated around the so-called Brigantine area, located on the eastern border of Pará. This area at the same time received a disproportionate share of economic activity, government investment and regional development incentives. At the same time, as presented in chapter VII, this is the area where most manifest (open) conflicts have been reported.

9.3.2 What is the specific role of environmental change?

The above argumentation in terms of the definition of environmental conflicts leads to argue that there is a second aspect that deserves to be revised. The case studies have provided sufficient data to argue that in terms of the theoretical framework and for analytical purposes it is insufficient to maintain that the environment plays a role as an interactive source in generating social conflicts. We need to develop further work in order to determine what specific role the environment plays in this context.

It is insufficient to argue that the environment plays a role. That has already been argued in other studies, notably Homer-Dixon's work. What is more important for analytical purposes is to place environmental change as an interactive source generating social conflicts, and then to see how and with what other sources environmental change interacts in order to generate social conflicts. According to the assessment made it is possible to distinguish between two types of roles: trigger and aggravator.

A trigger of conflict is a proximate cause; the factor triggers the system beyond a critical threshold. If environmental change is going to act as a trigger, the process of environmental change has to be acute. For instance, a strong drought, an enormous flooding or a high level of deforestation would have to take place. A claim that environmental change is an aggravator suggests that the factor interacts with other factors to produce conflicts. Most cases in the Brazilian Amazon can be placed within this framework.

Looking at the empirical data one clearly sees that there is empirical evidence supporting that environmental change can act as aggravator. For instance in terms of soil, the low ecological carrying capacity of the Amazon basin, especially in the tropical *terra firme* soil, brings about specific limitations to colonisation and agropastoral activities. Thus, the rapid decrease in agricultural production on colonised soil inhibits capital accumulation, settlement stability and consequently the construction of stable social relations. Thus, this situation causes permanent migration, accompanied by further deforestation resulting in most cases in open conflicts on access to land-resources.

Another example is open conflicts as a result of forest depletion in the Brazilian Amazon. The process of deforestation and ranching activities in general has had a direct effect on the lives of the forest-dwellers. The most evident conflict has been the expropriation of the customary lands of forest peoples. This situation has to do with the surviving strategies of several groups such as Indians, rubber tappers, nut collectors, and Q*uilombos*, whose way of living is strongly related to nature, and their social organisation is based on the communal use of natural resources. This way of living is in opposition to the private exploitation of these resources by miners, large landowners, mining companies, and logging enterprises, etc. The most well-known case related to open conflicts due to forest depletion has been the assassination of Chico Mendes, the former president of the Rubber Tappers Union.

9.3.3 Implications of the main research question

The third point refers to the main question posed in this study. It should be remembered that the main question placed by the Toronto group was: Does environmental scarcity contribute to conflict? However, my question is: Does environmental change contribute to the emergence of manifest conflicts?

Linked to the above questions, Homer-Dixon's model was formulated in terms of can variable X cause changes in variable Y. The Toronto group did not give so much priority to the analysis of other independent variables, even though they were aware of the existence of other variables. My approach has been different in that way. While the Toronto group tries to isolate the specific contribution of scarcity in generating violent conflicts, I focus more on the ways in which environmental change interacts with allocation of resources, distribution of land, and population growth, and, consequently, how these variables in turn cause open (manifest) conflicts. The above has been done not only for comparative purposes (in order to see the specific contribution of each variable), but in addition to provide a more systemic understanding of the research problem. This has been achieved by showing how these independent variables are not totally independent, but related to each other.

In effect, a substantive aspect to be learned from the four independent variables is that there are important relations among them. In a way all of them form a whole that I have tried to understand by its constitutive parts. For instance, population growth as a result of a large

number of landless and *garimpeiros* arriving in Pará is clearly linked to other sources such as land distribution, considering that the unfair distribution existing in Brazil acts as a mechanism of population movement (migration of poor people). In the same way, allocation of resources is related to environmental change in the way that many areas where resources were allocated present a strong pattern of environmental change, however it does not mean that allocation determines deforestation. At the same time, in the case of Pará, a particular association could be established between allocation and land distribution. For instance, during the decade 1970-1980 land concentration worsened in Pará, occurring at the same time that most incentives were allocated to the state. As was shown in chapter VIII (see graph No.13) the land area covered by properties over 1,000 hectares increased from 18.5 % in 1960, to 32.6 % in 1970, and to 35.4 % in 1980. At the same time the land area covered by properties under 100 hectares fell in the same period from 25.5 % in 1960, to 21.8 % in 1970, and to 20.6 % in 1980 (IBGE, 1984).

Another clear relationship can be found between population growth and environmental change. It could be argued that this interplay has been fundamental in precipitating violent conflicts. Group clashes are an important feature in Roraima and Pará due to the fact that an important number of groups with different social backgrounds have come together to share the same physical space. Thus, the combination of thousands of people coming to these states and the displacement suffered by them due to environmental change has provoked a condition of deprivation and unequal access to natural resources, provoking hostility among groups. Thus, one can understand why in Roraima the large arrival of *garimpeiros* has resulted in violent conflicts between Indians and small-gold prospectors. In Pará a similar pattern has been experienced with the difference that the scenario is more complex due to the larger number of actors involved. In fact, Pará has not only experienced the arrival of thousands of *garimpeiros* as Roraima, but also the arrival of thousands of landless competing for the physical space with large and medium landowners, Indians, nut-gatherers, miners, mineral companies, and logging companies.

9.3.4 On the level of conflict

A fourth major point is that according to ENCOP environmental conflicts can be divided into three levels: when the environment plays a role between groups within a country, when internal conflicts become internationalised, often through population displacement and finally when interstate conflict arises from the degradation of regional environments of the global commons. After presenting the empirical data it can be argued that currently the most important level in terms of the emergence of environmental conflicts in the Brazilian Amazon is the first one. The second and third level are less relevant, however they are not absolutely absent in the Brazilian Amazon. In effect, it cannot be argued that the process of environmental change has caused interstate conflicts among Amazonian countries. Moreover, conflicts have not been fully internationalised. For instance, the side effects of the process of environmental change have not promoted widespread violence beyond the Brazilian Amazon borders. However I use the phrase “not been fully”, because there is some level of internationalisation. For instance, conflicts between *garimpeiros* and Yanomanis have reached Venezuela, and have provoked some level of disagreements between the Brazilian and the Venezuelan governments. Thus, using a spill over analysis the regional level could become relevant in case that some of the conflicts described in this study at the national level spill over to the regional level.

In addition, as I will show in section 9.4 the regional level does play a role, however this is more related to the environmental security approach, mainly in terms of the new set of threats that the Amazonian countries are facing (drug trafficking, smuggling, biopiracy etc) as well as in terms of the relationship of the entire Amazon with the international community. That is

why in the following sections I defend that the regional level could be an interesting level for future studies. In fact, it has been argued in this study how it is possible to observe certain levels of dissensual conflicts at an international level when it comes to the management of the Brazilian Amazon. As I have stated before, there have been strong disagreements in terms of how the Brazilian Amazon should be managed. The conflict does not refer to the need to do it, but to the way of doing so.

9.3.5 The missing factors in previous studies: co-operation, conflict widening, conflict complexity and conflict escalation

As a fifth major point this study believes to have contributed to expanding the discussion of the role of environmental factors in the generation of conflicts. Providing the empirical material has allowed me to observe the role of environmental change in promoting co-operation. Moreover, in understanding the so-called widening conflict, conflict complexity, and conflict escalation.

Also contributing to the theory derived from the empirical data is that the study shows that environmental change as an independent variable not only contributes to conflict, but also could contribute to promote co-operation among agents. The reported case between *garimpeiros* and Kayapó in Pará is a good example. In this case, the Kayapó decided to negotiate the access and utilisation of their lands with *garimpeiros*. In Pará Indians have been able to negotiate with *garimpeiros* and to get royalties from the use and exploitation of mineral resources on their lands. The Kayapó have a long tradition of negotiating with outsiders, a factor which has facilitated negotiations with *garimpeiros* and the government (see chapter VII). The Kayapó managed a very successful negotiation partially because they presented a united bargaining front to the *garimpeiros* and the government. As a result the Kayapó in Pará have been successful allowing other agents to exploit mineral resources and getting considerable profits from it.

Another important aspect missing in most theoretical debates on environment and conflicts, and that this study has proven to be important, is the process of widening conflict and growing complexity. As was mentioned in chapter III, conflicts become "wider" because other parties become involved in the original situation of goal incompatibility. The analysis of the main actors carried out in this study has contributed to the understanding of such process.

In the case of Pará it is difficult to think that more parties will be involved in the three types of conflicts pointed out (land, mining and Indian lands). This is because in one way or another all the actors with concrete interests have already been involved. However, one could expect conflicts widening in Pará if existing actors take up new issues, and thus become parties to new conflicts. For instance, until now the Catholic Church has been basically concerned with the land problems, however, one could think that in the near future they will be more involved in fighting against the process of environmental change, and if that occurs then one could expect a conflict widening.

In Roraima the situation of conflict widening through the involvement of more actors is slightly different, because the MST has had almost no presence there. In fact, most of the activity of this organisation has taken place in the south of Brazil. For instance, according to a recent data by the MST (2000) there are no encampments (*acampamentos*) belonging to the MST in Roraima. If the MST decided to make Roraima a strong point of its campaign, then we could also expect direct participation by the UDR. However, considering the Brazilian land problem it could be expected that the MST would enter into Roraima's dynamics sooner or later. Consequently, we could expect a widening of conflicts in Roraima because of a more active participation by the MST and the UDR as well. The above is important due to the fact that the introduction of new parties normally complicates the original conflicts, in the sense

that other goal incompatibilities become involved, and therefore the addition of new parties make the conflicts more complex.

In addition to the situation of conflict widening and complexity, one should be aware of *conflict escalation.* If the parties involved in the conflicts become more absolute in their positions in the near future the malignancy of the conflict could increase making the conflict more intractable. An increase in the malignancy of the conflict usually generates a process of conflict escalation. As Mitchell (1981) indicates, escalation is "a process by which the parties to a conflict embark upon a mutually destructive process of increasing the level of coercion or violence in the threats or actions they direct against each other". For instance, if the current government of Fernando H. Cardoso does not find a way to solve or at least mitigate the land problem (via an effective agrarian reform or another mechanism), one could expect a more absolute position by the Brazilian Landless Workers Movement (MST). Today the MST is the largest social movement in Brazil with strong national and international support. Thus, one could think about conflict escalation in two ways: firstly intensifying an existing strategy, and secondly employing the same strategy in different geographical locations. In the former case a focus of action for the MST could be the state of Pará, where the MST has had very little activity in spite of being a state with a high population of migrants and landless. In the latter case Roraima could be a new geographical location for using the strategies of land occupation. Until now the presence of the MST in Roraima has been almost non-existent.

In short, the empirical analysis of conflict widening, conflict complexity and conflict escalation has proved to be important for explaining how conflicts could evolve, and therefore for identifying future conflict scenarios. This has important implications for policy making and for designing strategies of conflict prevention.

9.3.6 Final considerations on independent and dependent variables

The last aspect to be commented on in this section is that from this study we have learned about the need to choose case studies where there is a difference in the performance of the independent as well as dependent variable. Thus, I pointed out in chapter III, section 3.3 that one of the differences with the ENCOP and Toronto groups is the definition of a clear threshold for the dependent variable. Thus, using data from the Pastoral Land Commission I have developed a comparative analysis using manifest conflicts as a threshold. The section 8.3.1 shows for instance the number of people killed in land conflicts and Indians killed in conflicts over Indian lands (see graphs 16 & 18). The above has been particularly useful because it has allowed me to leave out cases such as death threats, which can also be called conflicts, but in which violent physical behaviour has not been present. The threshold is not arbitrary, but rather it is in fact quite useful for getting a more precise relation between environmental change and violent conflicts. Therefore, this can be considered as an important element to be taken into account for future studies.

For the independent variables the use of the comparative analysis and the application of the method of paired comparison (precense-precense) have been central in order to see the importance of each variable. This has allowed me to move away from deterministic models. In fact, the case studies have shown a great difference in the performance of the independent variables, notably environmental change and allocation of resources.

My final point is to explain why we have such differences in the outcome of the independent variable. After analysing the empirical data I stress the validity of one of my propositions. As I pointed out in the third chapter, variations in the independent variables can be understood through the role played by the frontier dynamic in both states. The concept of frontier has been central in understanding the development of the Brazilian Amazon. In the Brazilian Amazon this has normally been associated with economic expansion, meaning basically the incorporation of the Brazilian Amazon into the national economy. This

economic expansion takes place via the occupation of new land and the absorption of migrants by these areas. The application of frontier strategies in the Amazon is in many ways the result of the conceptualisation of the basin as an empty space that had to be integrated into the national economic space in order to solve the socio-economic problems of the region, as well as of Brazil as a country.[167] In other words, the conception was that the country's economic frontier was to be expanded so as to incorporate new regions into the process of economic development.

What I argue here is that this notion based on the absorption of peripheral regions by the expansion of a capitalist economy has turned out to be been stronger in Pará than in Roraima and that such situations explain differences in the outcome of the independent variables. In the case of Roraima it is doubtful to argue that frontier dynamic has been fully consolidated. First of all, Roraima's economy can not be considered as being entirely market oriented. Thus, it is notorious how the informal sector has been the leading factor in Roraima's economy. Secondly, the process of complete incorporation into the national economy has not resulted. Thirdly the composition of social actors is more complex than the simple peasantry phenomenon. Therefore, factors such as Roraima's informal economy, the insignificance of pioneer agriculture, and the existence of certain cattle ranching activities in a non-capitalist form make it difficult to fit Roraima under traditional frontier theories. Moreover, the limited existence of land conflicts characteristic of frontier development and the low level of environmental destruction make Roraima a special case when it comes to understanding its development through the concept of frontier.

Concerning mining activities, MacMillan (1995) argues that the word frontier is misleading when applied to the gold rush because it gives the false impression that a capitalist mode of production is encroaching upon a peasant or non-capitalist economy. The truth, according to MacMillan, is that the economic and social relations of the Amazonian informal mining economy are essentially non-capitalist. Thus, he adds while there are a handful of large corporate mining projects in the Amazon that can be described as capitalist, by far the greatest share of the region's output of gold and diamonds as well a large portion of its tin-ore is produced by hundreds of thousands of *garimpeiros* that not only work outside the capitalist economy, but their work relations are also non-capitalist (MacMillan: 1995, p.3). Therefore, the concept of frontier associated to the market economy does not fit in Roraima. The mining sector is a case in point, because here in the *garimpos* the economic and social activities are to certain extent non-capitalist, the work relations are totally informal, contracts are agreed verbally, incomes are not declared and no taxes paid. The *meia-praca* system constitutes a clear example of how informal the mining sector has been.

A safe generalisation about Roraima's mining economy is that the informal sector is more important than the formal one, which is not the case in Pará. In Roraima mining is the most important informal sector activity, in terms of both the number of people involved, and the value of production. There is not an exact figure of how many people are working in *garimpos*, however, the local newspaper *Folha de Boa Vista* reported in 1988 that 200

[167] The political economy of the Brazilian Amazon frontier has been approached by several scholars, among them the anthropologist Otavio Velho, and his work "*Frentes de Expansao e Estructura Agraria*" in 1972, as well as "*Capitalismo e Campesinato*" in 1976. Finally, Velho in a collection of essays entitled "*Sociedad e Agricultura*" develops the theory of frontier development and the implications for the peasantry. Other major contributors are by the sociologist Jose de Souza Martins and his work "*Frente Pionera: Contribusão para una Caracterizasão Sociológica*", and finally, Joe Foweraker's work "*The Struggle for Land: A Political Economy in the Pioneer Frontier in Brazil from 1930 to the Present Day*", Cambridge 1981; and Donald Sawyer who has approached the concept in a revisionist way in "*Frontier expansion and retraction in Brazil*". In M. Schmink & C. Wood (1982).

migrants per day were entering the state, and although no precise figures exist, it is estimated that around 40,000 people were working in Roraima's *garimpos* during the following three years.

Another example related to the weak development of frontier strategies in Roraima is that the development of an atypical market form in the ranching economy. For instance, the traditional system of payment known as *sorte* which is used in Roraima's remote interior illustrates such a situation. In this system the *vaqueiro* is not paid in wages as other employees. Normally the *vaqueiro* receives one of every four calves produced during an agreed period. The system of *sorte* as explained by Riviére (1972) is ideally suited to a region in which land is not a scarce commodity and in which cattle cannot readily be converted into money because of a lack of markets. However, recently the system of *sorte* is quickly disappearing as soon as markets become available and most ranchers prefer to pay in cash. As can be seen with the *sorte* system the ranchers of remote interior Roraima are not involved in a purely money-oriented economy.

Moreover in Roraima the idea of absorption of peripheral areas has not fully taken place. For instance, if one takes into consideration one of the most important tools of frontier development, which is road building, then immediately one realises that neither the BR-174 nor the BR-210 have promoted the real incorporation of Roraima into the national market economy. In the case of mining it is possible to note how the mining sector is not dependent on the road network in the same way as the agriculture economy is. Therefore, recent efforts to incorporate Roraima into the national economy through the road system have not had a significant impact on *garimpo* activities. This is because the most significant goldfields are to be found in isolated parts of western Roraima, and most of the gold is transported to the urban centre in small aircrafts.

What is different in Pará? As previously stated, frontier development is understood as economic expansion that takes place via the occupation of new land and the absorption of migrants by these areas and the integration of these areas into the national economic space. The above conceptualisation clearly fits into the development of Pará. Three aspects exemplified the above affirmation: firstly, the existence of mega-projects, secondly the allocation of enormous resources to this area, and finally the large number of migrants arriving to the area.

Mining activities is a good example for illustrating the importance of corporate activities in Pará. The main corporate activity is localised in the Carajás corridor. Road building has been a central element promoting colonisation schemes and facilitating the incorporation of Pará into the national economy, and the construction of the Belém-Brasilia highway is a case in point. Moreover, looking at the data on allocation of resources also gives us the idea of how Pará has been more exposed to frontier development than Roraima. In fact, as it has been shown in this study, financial and fiscal incentives were heavily allocated in Pará, aiming to promote the integration of this area into the national economy. In fact, by 1986 Pará received SUDAM resources for a total of 424 projects, while Roraima received resources allocated for only 18 projects. In nominal terms in Pará SUDAM financed one project for every 53,113 hectares, but Roraima was financed for an average of one SUDAM project per every 165,378 hectares. An important aspects to be considered is that most of the incentives went to ranching.

For all these reasons land became an instrument of speculation, rising the number of land conflicts. Finally, Pará also shows a strong link between all these activities and the extensive migration into Pará. This can be noted in the fact that the municipalities in southern Pará with the highest population growth in the 1980s were those in which most of the mechanisms of frontier development (roads and allocation of resources) were implemented. Examples of this situation are Marabá, Itaituba and Altamira.

9.4 Suggestions for future research

I would like to conclude this study by suggesting a research area closely linked to the research problem discussed in this study. I will attempt to further develop the discussion on environmental change, security and conflict in the Amazon, by first discussing how environmental conflicts and security concerns could lead to the formation of a regional security regime in the Amazon, while using the environment as the main object of reference. Moreover, and as a result of this, I will explain the constitution and development of such regional security regime in the Amazon so to be able to address the implications of the process of regional integration in South America. In order to do so, this section concerns five aspects: it first focuses on the conceptualisation of security regimes and the notion of region; secondly it attempts to answer the question of why a security regime is necessary in the Amazon basin; thirdly it points out why current environmental security concerns in the Amazon basin could precipitate the formation of a regional security regime; fourthly, what types of benefits that could produce a regional security regime for the Amazonian countries are discussed; and finally there is a debate on how such a security regime can promote or perhaps block the future creation of a Latin American Common Market.

9.4.1 What is a security regime?

A security regime is a formal or informal arrangement whose main objective is to significantly reduce, if not eliminate, the likelihood of conflict or war by securing adherence to a set of norms and rules that constrain the conflictual behaviour of the regional actors in relation to one another (Acharya, 1994: p.89). An analysis of a security regime in the Amazon could cover a variety of formal and informal arrangements including environmental conflicts avoidance. In relation to security the term "region" means that a distinct and significant subsystem of security relations exists among a set of states whose fate is that they have been locked into geographical proximity to each other (Buzan, 1991: p.188). These distinct and significant security relations are determined by the fact that the Amazon is shared by nine countries, which once again introduce the question of collective actions.

Furthermore, studying the conformation of a regional security regime that includes the Amazon countries is interesting when considering that the dominant theories of regime formation explain that it is difficult for states to agree or co-operate in security affairs for two reasons. First of all, as pointed out by Scott (1995), defence policy is the basis of a state's existence and a regional security regime represents a commitment among states to trust one another and, in effect, to lower their guards. National leaders normally do not take such a step unless there is a pressing need and little risk of defection from the regime. Consequently, there is the question of whether the Amazon countries have reached the point of trusting each other to be involved in a regional security regime. The basic problem is that despite the fact that there is no current open conflict between Amazonian countries, some countries still have the Brazilian image as an expansionist country.

Moreover, the recent conflicts between Brazil and Argentina within MERCOSUR are a clear example that mutual trust is something yet to be established. From the game theory and other discussions, trust has been characterized as country's belief in which co-operation is predicated. Trust, in short, refers to the co-operating parties perception of each other and their mutual relations. But the cognitive prerequisites of co-operation also include perception of the issue area in question. In the game theory inspired literature, it is mainly a matter of perceived pay-offs. The more substantial the gains from mutual co-operation and the less substantial the gains from unilateral defection are perceived to be, the greater the likelihood of co-operation (Jönsson, 1997: p.208-209). However, co-operation depends not only on perceived pay-offs of given alternatives, but in some cases as Jönsson (1997) states, an agreement often required a *formula*, a shared perception or definition of the problem. In this view the development of

common a perception becomes more important than the exchange of concessions. In the Amazon the common perception can be related to the fact that all the Amazon countries fear the so-called internationalisation of the Amazon.

The second reason that makes co-operation difficult is that even if states want to form a security regime, without reliable information about rival's capabilities and intentions it is hard to determine whether an action reflects offensive or defensive motives. Thus, in many cases the effort by one State to increase its own military security may be perceived as a threat to one or more States, who may in turn respond in a way that further threatens the security of the former. This is what Jervis (1983) called the security dilemma. The building up of SIPAM could be a good example. Thus, Brazil has been careful in providing information to neighbouring countries, and to a certain extent selling the idea that this is a regional project, not only a national one. In fact, as pointed out by Dreifuss (2000), SIPAM is an instrument for diplomatic approaches to the defense of the region that allows for the integration of government agencies representing the various Amazonian countries, thus composing an international safety net, as well as facilitating transnational interaction of non-governmental actors. Various initiatives form part of this integrated diplomatic and political-strategic effort on the sensitive Amazonian border. These include sharing databanks, sensor systems for environmental surveillance, developing joint effort for nature preservation and the establishment of joint venture in biotechnology, as well as deepening understanding for the protection of indigenous cultures.

In short, it will be useful to study whether the above factors could block the formation of a security regime in the Amazon. Thus, in order to introduce a balance in the analysis the following sections (9.4.2 & 9.4.3) attempt to present the factors that could contribute to the formation of a security regime. Therefore, an interesting task for future study will be to assess what type of factors (the blocking or the promoting) are likely to have primacy in the basin.

9.4.2 Why a security regime in the Amazon?

The section 9.4.1 has shown that there are factors that could block the formation of a security regime in the Amazon basin, however as I will present in the current and next section there are as well other factors that could promote the formation of a security regime in the entire basin. As it has been already suggested a first step of research could be to address the possibility for institutional building in the Amazon. More specifically, to study how a regional security regime (having the environment as a new object of reference) can take place in the Amazon. As stated by some scholars (Jervis, 1983; Gross Stein, 1985) security regimes are thus relevant to a regional context in which the interests of the national actors are neither completely conflictual nor completely harmonious, and where it might be possible to secure compliance with principles, rules and norms that permit nations to be restrained in their behavior in the belief that others will reciprocate. Following this line of argumentation, the notion of a regional security regime in the Amazon can be useful because it directs attention to the possibility of security co-operation where actors share a set of regional environmental problems and/or threats without a clear security framework for dealing with such regional environmental problems and conflict resolution. Thus, the Amazonian states presently do not perceive each other as the main source of danger, even the long conflict between Perú and Ecuador has now ended, with a peace agreement being signed in 1998. However, even though no open conflict exists, the management of the entire basin represents a series of costs to be distributed among participants, since the Amazon problems are regional rather than national. In addition, in the Amazon internal threats are basically conceptualised as non-military, and at the state level threats are perceived mostly as coming from outside the region.

Three more reasons to study the formation of a security regime in the Amazon using the environment as an object of reference are: regional integration is becoming more important in

South America, and as a result perhaps we need to shift the focus from the national level to the regional level, or at least to integrate the regional level into the security analysis. Second, the management of the Amazon basin poses important questions regarding collective action. An additional reason is that mainstream theories on the formation of security regimes emphasise the importance of great power and hegemonic states, but there has been a lack of attention to security regimes of small states. That is a reflection of Realism and Neo-realism prevalent in the field.

In summary, it will be interesting to see whether the development of a regional security regime having the environment as an object of reference will imply that the classical notion of sovereignty will be redefined within a new context of ecological interdependence. Similarly, whether the idea of national interest can be re-conceptualised as one of common interest, meaning joint management of the Amazon by all the countries included in the basin.

9.4.3 Why current environmental security concerns could precipitate the formation of a regional security regime?

Two more factors must be considered to continue arguing for the formation of a security regime in the Amazon. A central point is that regionalism in the Amazon is increasingly sensitive to pressures emanating from the global level, basically in its economic and environmental forms. It has been determined how one of the main security concerns in Brazilian Amazon has been the so-called internationalisation of the Amazon. These global pressures are basically felt in terms of forest protection, biodiversity maintenance, and the demarcation of Indian lands. Indeed, shared vulnerabilities of the Amazon countries to global economic and environmental pressure could redefine the security goal of the Amazon countries. Thus, the formation of a regional security regime having the environment as a point of reference could promote collective bargaining with Western powers. In short, the role of a regional group such as the Amazonian countries would deny outside powers, especially superpowers, the opportunity to intervene.

The second factor is the character of interdependence of the Amazonian countries. This is basically understood when two or more entities find themselves in such a situation that they may or will discover that their own behaviour is being affected by that of the other(s), and that they themselves have the capability to affect the other(s). All the Amazonian countries share a set of regional environmental problems and/or threats without a clear security framework for dealing with such regional environmental problems and conflicts. In fact, most environmental problems in the Amazon have a regional character, and in most cases they are transboundary in terms of the effects. In the case of the Amazon the transboundary nature has two dimensions. Firstly, the Amazon ecosystem extends into nine countries, e.g. Bolivia, Brazil, Colombia, Ecuador, French Guyana, Guyana, Perú, Surinam and Venezuela. Moreover, in the Amazon some environmental goods appear as collective goods, though not global, they show a high degree of interdependence between both issues and actors at a regional and a global level as well.

The conceptualisation of a security complex developed by Buzan (1991, 1998) can be useful to explain why interdependence could facilitate the formation of such a security regime. To Buzan (1991, 1998), security complex is "*a set of units whose major process of securitisation, desecuritisation, or both are so interlinked that their security problems cannot reasonably be analysed or resolved apart from one another*" (Buzan, Wæver and de Wilde, 1998: p.201).

The above argument introduces the discussion of the relational nature of the regional security concept. In fact, one can not understand the security of the Amazon without understanding the security concerns of all the Amazonian states and the international system

in which the security is embedded. As has been stated by Buzan (1991), comprehensive security analysis requires that one takes particular care to investigate how the regional level mediates the interplay between states and the international system as a whole.

The concept of security complex can be perceived in the Brazilian policies for the region. For instance, as stated by Dreifuss (2000), Brazilian frontier policy in Amazonia takes into account the country's regional weakness in high quality petroleum, compared with its Andean Amazonian neighbours, who also have a great competitive hydroelectric potential and significant biomass extensions. Thus, energy-oriented integration of Brazilian Amazonia with neighbouring countries is on the strategic agenda. The goal is to take advantage of the energy potential shared with neighboring countries, allowing Brazil to implement its strategy of energy interdependence as an instrument for regional stability and a stepping stone for a possible MERCONORTE.

But there are other initiatives that could be seen as a part of a strategic cooperative interdependence. These include, for example, construction of highway BR174, which will link Manaus to the Venezuelan border, and the Brazilian proposal to supply the technology to recover areas downgraded by mining. The strategic partnership also involves intense border commerce between Brazilian states of Roraima and Amazonas and the Venezuelan state of Bolivar. An incipient partnership also includes joint policies regarding environment and cooperation to preserve biodiversity and to undertake ecological zoning, as well as fishing and phyto-sanitary agreements. (Dreifuss, 2000: p.229).

9.4.4 What are the benefits participants could expect by creating a security regime in the Amazon?

One of the most cited arguments explaining regime formation is that if participants perceive that they have common interests and that the benefits - the payoff - of joint actions are greater than those of unilateral action, they are likely to co-operate, and then possibly to form a regime. Following this argument the next question will be: *What type of benefits is going to produce such regional security regimes for the participants?* In the Amazon basin the vital aspect that could influence behaviour of the actors in favour of the formation of a regional security framework are: the utility and security function.[168] For instance, the Amazonian state as a regional block could be more effective than the nation-state in solving collective action problems such as the ones present in the Amazon (maximise utility), as well as defending a collective entity against foreign powers (security function). In the context of global competition the regional level provides more bargaining power than the State level. This is particular relevant for States and regions facing international pressure such as the Amazon and in which there are not truly hegemonic states.

To further develop the argument in the former case the utility-maximising motivation can be an economic one as in the case of MERCOSUR, but as pointed out by Hveem (1999), motivations may also be based on non-economic, mainly ecological goals. In the case of the Amazon this can be to combat forest fires, to stop biopiracy, to regulate deforestation, and regulate common river basins. The regional scope of this issue-area relates basically to two inter-related dimensions. In the latter case in the Amazon the security function could be the most important motive because of the global pressure, and the so-called internationalisation of the Amazon. As presented in this study (chapter III, V and IX), such security motives have not necessarily been associated with military security, but currently have a comprehensive nature in the Amazon. There are several factors that explain such international concerns for

[168] For an analysis of benefits that participants expect when getting involved in a regime see Helge Hveem (1999) in Diana Tussie (ed.), "*The environment and international trade negotiations.*" 1999.

the Amazon. Some of these factors are well taken by Viola (2000), thus he refers to the general consensus of the scientific community and policy makers of the importance of the Amazon in terms of climate and biodiversity, and the intense campaign of international NGOs for preserving such environmental goods. Secondly, the formation of transnational coalitions around some specific Amazonian questions, e.g. the negative impacts of the mega-projects such as Polonoroeste, Balbina, and the paving of BR364 between Porto Velho and Rio Branco. Thirdly, the highly publicised idea that the Amazon is the world's lung, and that the Brazilians are cutting and burning down this lung. Finally, events such as the murder of Chico Mendes in 1988, and the international pressure for the establishment of indigenous reserves can be mentioned.

In summary, the probability for the formation of a security regime in the Amazon seems to be linked to the systemic hypothesis that states if the density of transactions between the states concerned is high, the demand for the establishment of an international regime tends to increase. In the case of the Amazon basin such density is high, and easily perceived by the fact that all these States share one resource, and therefore share the problems and costs associated with its management.

9.4.5 Security regime and regional integration.

To begin with, regional security dynamics could get greater academic and political attention in the near future. In the Amazon the environmental sector is an interesting case because of the nature of the threats, and the interdependence of the Amazon countries in terms of the basin. Today many of the rivers belonging to the basin are used for public and commercial transportation, fishing, and the generation of hydropower without a joint regulatory regime. Currently there is a strong degree of interdependence among the Amazonian states not only in being faced with the Amazonian rainforest, but also since all of them are in one way or another part of the integration process taking place in South America. Of the Amazonian countries, MERCOSUR includes one full-member state (Brazil) and one associate (Bolivia), the largest territorial portion of the Amazon basin.

The question is to what extent the constitution of a regional security regime in the Amazon could promote an enlargement of MERCOSUR. In a neo-functionalist perspective, that would be if the regional security regime could act as a sort of *spill-over*. For our analytical purpose it is interesting to assess whether the formation of a security regime could spill-over to the enlargement and consolidation of MERCOSUR as a possible Latin American Common Market. If an international regime represents a commitment by the actors to seek the benefits of long term co-operation in a particular area, then, as pointed out by Haas (1997), this co-operation might spread out to other issues as an official realisation that co-operation in one area cannot yield maximum benefits unless they co-operate in related areas. In its classical formulation it means that if there is integration success in one sector, success will spill over into another sector and pull it into line. However, as pointed out by Hveem (1999), this assumption of a spill-over mechanism, perhaps a little too mechanistic as it is, is mirrored by a 'spill-back' mechanism: if integration fails in one sector, failure may spill back into another sector and pull it into non co-operation. Thus, it could also be interesting to see that side of the coin (spill-back) in the Amazon.

Thus, a future study could focus on assessing the implication of a regional security regime's formation in the process of integration in South America, mainly MERCOSUR and a possible future Latin American Common Market (MCLA). Thus, one could study whether the success of a regional security regime could promote a new phase for the integration process taking place in South America, or the failure of such regime could act as a spill-back mechanism for regional integration.

If, as Tussie (1999) points out, MERCOSUR could be understood as a means for member countries to expand outward to foreign markets and attract direct foreign investment, in a context of unilateral and multilateral trade liberalization, then one could expect a natural geographical expansion of MERCOSUR. In fact, MERCOSUR has already attracted Chile and Bolivia as associate partners, and Venezuela in considering such possibility. This fact shows a northward expansion of MERCOSUR, where Brazil has a privileged position not only by its economic dynamism, but also because of its geographical characteristic, which can be considered a link between the southern zones, the Amazon and the Caribbean. This expansion could be understood in the context of the creation of a free trade area of the Americas (FTAA) by 2005.[169]

The above process can promote a continentalisation of the integration process in South America. For instance, by linking the Amazon basin to the Orinoco and the Plate basin it can be expected that MERCOSUR can be intertwined with a future MERCONORTE that will include Peru, Ecuador, Colombia, Venezuela and Guyana, all of them Amazonian countries. Thus the Amazon could give an incentive to create an enlarged South American economic space that could evolve in the formation of a Latin American Common Market.

Finally, in the context of MERCOSUR's expansion the struggle over the control and/or way of sharing one given natural resource attains a great importance. That is why the Amazon basin and connected basins such as the Paraná-Paraguay waterway, the Orinoco basin and many of the international basins in the Amazon take a paramount importance in the region. As indicated by Tussie (1999), the management of shared natural resources has always been a conflictive issue, and thus high on the regional agenda, an example being the dispute over control of the River Plate Waterway system. However, at the same time she points out that in MERCOSUR the danger of the environment as being a zero-sum game is no longer present. The above is in correspondence with the operation of a regime, after all, as argued by Krasner (1983), one of the central reasons for the building of a regional security regime is that it is one of the most important ways out of the Realist zero-sum view.

9.5 Final meta-theoretical observation

What we have learned, perhaps more than anything else, is that the understanding of the dynamics of environmental change, security and conflicts in the Brazilian Amazon should start with the recognition of the wide web of interdependencies between issues and actors at different levels.

In the first chapter of this study I argued that even though there is a vast literature dealing with different aspects of the Amazon basin most of the studies were lacking an integrated perspective. As mentioned in chapter I, it is imperative to *shift from object to relationship* in the study of the Brazilian Amazon. The study of relationships allows us to discover the wide web of interdependencies in terms of issues and actors. Thus, future studies should consider approaching the Brazilian Amazon from a more systemic perspective where the natural and social factors can be integrated in one framework of analysis.

For example, it is not by studying what I called in chapter V *main attributes of the Brazilian Amazon* that one could fully understand the dynamics of the Brazilian Amazon and the most important events taking place there, but by relating these attributes to the socio-economic framework. Hence, in order to explain the process of environmental change, social factors must be considered. In the same way, natural factors such as soil fertility, forest cover, and water types have to be considered when explaining social conflicts.

[169] The basic goal of FTAA is to remove all the barriers to trade and investment by the year 2005, as agreed by the heads of states gathered in Miami in the first summit of the Americas in 1994.

When it comes to actor interdependence this study has shown that the Brazilian Amazon is a universe where many different interests meet. In effect, it represents one of the best examples of conflicts not only between different social groups, but also between heritage and modernisation, environmental protection and economic development, and between the south and the north. In this sense, the Brazilian Amazon is a region where many actors converge with particular interests, generating a process of systemic conflicts. In the Amazon, Indian populations and rubber tappers depend strongly on the forest. Migrants and landless need to obtain land and a future. *Garimpeiros* and *grileiros* flood into the region with a short-term perspective, usually highly conflictive. However, they are just the result of exclusion from the socio-economic system. Small farmers want to convert a generally inexpensive good into a valuable and marketable one. The typical way is clearing the forest. Large landowners are doing the same to show that their land is productive and therefore not subject to expropriation.

Additionally, in this systemic and conflictual landscape we have conservationists and environmental NGOs who want to preserve the ecosystems, while Brazil, as a country wants to improve its position in the international market, which means using its resources. International and national corporations are trying to defend their investments in the area, and multilateral institutions such as the World Bank and the Interamerican Development Bank continue to play an important role through their lending policies. In the same way industrialised countries stress the need to develop international policies to protect the Amazon rain forest, the PP-G7 being the latest example.

Consequently the above universe of different and contending interests at several levels suggest how useful it is to adopt a systemic perspective when analysing the Brazilian Amazon. It is clear that the phrase “the whole is more than the sum of its parts” as well as Commoner’s first law of ecology “everything is connected to everything else” find a clear empirical justification in the Amazon basin.

Bibliography

Acharya, Amitav. (1994) “Regional Approaches to Security in the Third Word: Lessons and Prospects”. In Swatuk, Larry and Shaw, Timothy. *The South at the end of the Twentieth Century: Rethinking the Political Economy of Foreign Policy in Africa, Asia, the Caribbean and Latin America*. M.St Martins Press, 1994.

Albert, Bruce. (1992) “Indian lands, Environmental Policy and Military Geopolitics in the Development of the Brazilian Amazon: The Case of the Yanomani”. In *Development and Change*, vol.23, pp.35-70. .

Alves, Diógenes. (1998) *Monitoring Amazonian Deforestation*. Paper presented at the conference Amazonia 2000: Development, Environment and Geopolitics. London, 24-26 June, 1998.

Albuquerque, Roberto & Villela Renato. (1991) “A Situação Social no Brasil: Un Balanço de Duas Decadas” In Velloso, João Paulo dos Reis, (ed.), *A Questâo Social no Brasil.* São Paulo, Brasil.

Allen, Elizabeth. (1989) *Calha Norte: Military Development in Brazilian Amazonia.* Paper presented to the international symposium, Brazil: Its Development Experience and Options for the Future. Stockholm University, December 4-6, 1989.

Amnesty International. (1988) *Brazil: Authorized Violence in Rural Areas.* London

Assis Costa, Francisco. (1992) *Estrutura Fundiaria, Modos de Produção e Meio Ambiente na Amazônia*. Seminario Internacional sobre Meio Ambiente, Pobreza e Desenvolvimento da Amazônia. Belém, 16 al 19 de Fevereiro, 1992, Pará.

Baines, Stephen. (1991) “The Waimiri-Atraori and the Paranpanema Company”. In *Critique of Anthropology*, vol.11 (2), pp. 143-153.

Balwin, David. (1995) “Security studies and the end of the cold-war”. Review article, *World Politics*, vol. 48, no.1 October, pp.117-141

Barata, Manoel. (1973) *Formação Histórica do Pará*. Coleção Amazônica. Universidad Federal do Pará.

Barbosa, Luis. (1993) “The Greening of the Ecopolitics of the World-System: Amazonia and Changes in the Ecopolitics in Brazil”. In *Journal of Political and Military Sociology*, vol. 21 (summer) pp.107-134.

Barrow, Christopher & Paterson, Andrew. (1994) “Agricultural Diversification: The Contribution of Rice and Horticultural Producers”. In Peter Furley (ed.) *The Forest Frontier. Settlement and Change in Brazilian Roraima.* Routledge. London and New York.

Barrow, Christopher. (1988) “The Impact of Hydroelectric Development on the Amazonian Environment: With Particular Reference to the Tucuruí Project”. *In Journal of Biogeography*, no.15, pp.67-78

Batt, Carl. (1976) “The Influence of the Natural Environment on the Development of Amazon Societies”. In *El Dorado,* vol.1, no.2, 1976.

Becker, Bertha. (1987) “The Frontier at the End of the Twentieth-Century Eight Propositions for a Debate on Brazilian Amazonia”. In Muegge and Stohr (eds.) *International Economic Restructuring and the Regional Community.* Avebury. Aldershot.

Becker, Bertha. (1989) *Estudo Geopolítico Contemporáneo da Amazônia*. SUDAM\ BASA\ SUFRAMA\ PNUD, 1989.

Becker, Bertha. (1991) *Amazônia*. Second edition . Editora Ática. Brasil.

Benchimol, Samuel. (1992) *Amazônia: A Guerra na Floresta.* Editora Civilização Brasileira. Rio de Janeiro, Brazil, 1992.

Benchimol, Samuel. (1994) *Exportação e Exportadores da Amazônia Legal*. Manaus, Amazonas.

Bernard, Susser. (1992) *Approaches to the Study of Politics*. MacMillan Publishing company.

Bertalanfly, Ludwig Von. (1993) *Teoría General de los Sistemas. Fundamento, Desarrollo, Aplicaciones.* Novena impresión. Fondo de Cultura Económica. México

Bethell, Leslie. (1992) *On Democracy in Brazil. Past and Present*. Occasional Paper no.7. University of London, Institute of Latin American Studies,

Binswanger, Hans. (1987) *Fiscal and Legal Incentives with Environmental Effects on the Brazilian Amazon*. Discussion Paper, World Bank.

Binswanger, Hans. (1989) *Brazilian Policies that Encourage Deforestation in the Amazon*. Environment Department Working Paper, no.16. Washington, D. C: World Bank.

Bojo, Jan; Karl, Goran & Lena Unemo. (1990) *Environment and Development: An Economic Approach.* Kluwer Academic Publisher.

Brigagao, Clovis. (1990) *Amazonia y Antártica: Diagnósticos de Seguridad Ecológica*. Comisión Sudamericana de Paz 1990.

Brock, Lothar. (1997) “The Environment and Security: Conceptual and Theoretical issues”. In Niels P. Gledisch (ed.) *Conflict and the Environment*. Kluwer Academic Publishers.

Brown, Lester. (1977) *Redefining Security.* Worldwatch Paper, no. 14. Worldwatch Institute, Washington, DC

Brown, Seyon. (1992) *International Relations in a Changing Global System*. Westview Press.

Bröms, Peter. (1995) *Environmental Security Regimes: A Critical Approach.* The Swedish Institute for International Affairs. Stockholm.

Bunker, Stephen. (1988) *Underdeveloping the Amazon. Extraction, Unequal Exchange and the Failure of the Modern State.* Chicago Press, United State of America, 1988.

Butler, J. (1985) *Land, Gold and Farmers: Agriculture Colonization and Frontier Expansion in the Brazilian Amazon*. Ph.D. dissertation. Department of Anthropology. University of Florida.

Buzan, Barry. (1983) *People, State, and Fear: The National Security Problem in International Relations*. Brighton, Harvester Wheatsheaf.

Buzan, Barry. (1991) *People States and Fear: An Agenda for International Security Studies in the Post-Cold War Era*. Second editions, Lynne Rienner Publishers.

Buzan, Barry; Ole Wæver and Jaap de Wilde. (1998) *Security a New Framework for Analysis*. Lynne Rienner Publishers, United States of America.

Castro, M; B Albert & W.C Pfeiffer. (1991) *Mercury Level in Yanomani Indian Hair from Roraima Brazil*. Paper presented at the international conference on Heavy Metal in the Environment. Edinburgh, September, 1991.

Capra, Fritjof. (1982) *The Turning Point: Science, Society and the Rising Culture*. Published by Simon & Schuster. New York

CCPY, CEDI, CIMI. (1989). *"Relatório Sobre a Viagem da Comissão da Ação Pela Cidadania ao Estado de Roraima"*, entre 9 e 12 de Junho de 1989.

CEDI. (1991) *"Povos Indígenas no Brasil"*. São Paulo, Brasil.

Chagas, Carlos. (1997) "Querén Internacionalizar a Nossa Amazônia". In *Manchete,* 05.07.97, Rio de Janeiro Brazil.

Choji, Paulo. (1994) *Desenvolvimento Sustentável: Un Abordagen Para as Questões Ambientais da Amazônia*. Tese de Doctoramento . Apresentada ao Instituto de Economia da Universidad de Campinas, 1994.

Christopher, Warren. (1996) *American Diplomacy and the Global Environmental Challenges of the 21st century*. Speech at the Stanford University, April, 9, 1996.

CIDR. (1992) *Relatório das Violências Contra os Indios en Roraima*. Assesoria Jurídica da Diocese de Roraima, e Conselho Indigína de Roraima.

CIMI. (1991) *A Violência Contra os Povos Indígenas no Brasil 1990*. Consehlo Indigenista Missionário,1990.

CIMI. (1992) *A Violência Contra os Povos Indígenas no Brasil 1991*. Consehlo Indigenista Missionário,1991.

CIMI. (1994) *A Violência Contra os Povos Indígenas no Brasil 1993*. Consehlo Indigenista Missionário,1994.

CIMI. (1996) *A Violência Contra os Povos Indígenas no Brasil 1994-1995*. Consehlo Indiginista Missionário, 1996.

CIMI. (1997) *A Violência Contra os Povos Indígenas no Brasil 1996*. Consehlo Indigenista Missionário, 1997.

CIR. (1992) *Relatório da Situação Fundiaria da Área Indígena Raposa/Serra do Sol*. Realizado pelo Conselho Indigína de Roraima de Agosto a Dezembro de 1991. Boa Vista, Roraima.

CIR. (1992) *Relatório das Violências Contra os Indios en Roraima*. Assesoria Jurídica da Diocese de Roraima, e Conselho de Roraima"

Cleary, David. (1990) *Anatomy of the Amazon Gold Rush.* MacMillan Press in Association with Saint Antony's college Oxford.

Cleary, David. (1991) *Amazonia and the Environmental Question in Brazil.* Special Report no.2100. The Economist Intelligence Unit.

Cleary, David. (1993) "After the Frontier: Problems with Political Economy in the Modern Brazilian Amazon" *Journal of Latin American Studies*, vol.25, pp-331-49.

CNBB. (1988) *In Defence of the Yanomani People*. National Conference of the Bishops of Brazil. Brasilia.

Cochrane, T & P. Sanchez. (1982) "Land Resources, Soils, and their Management in the Amazon region: A State of Knowledge Report" In Hecht, Susana (ed.), *Amazonia: Agriculture and Land Use Research*, Cali, Colombia.

Comisión Amazónica de Desarrollo y Medio Ambiente. (1992) *Amazonia sin Mitos*. BID\PNUD\TCA, 1992.

Conca, Ken. (1994) "Rethinking the Ecology-Sovereignty Debate". In *Millennium*, vol.23, no.3, 1994.

Congressional Research Service. (1992) *The Environment as a Foreign Policy Issue*. February 3,1992.

CPR. (1991) *Atualização dos Estudos Básicos do Vale do Rio Branco. A Questão Indígena*. Segunda Versão. CPR Coordenação de Planejamento Regional. Belém.

CPT. (1998) *Relatório dos Assassinatos no Campo 1985-1997*. Comissão Pastoral da Terra, 1998

Coser, Lewis. (1956) *The Function of Social Conflicts.* The Free Press. New York.

Costa, José M. (1992) "Impactos Econômicos-Territoriais do Actual Padrão de Ocupação de Amazônia". In José M da Costa (ed.) *Amazônia: Desenvolvimento ou Retroceso*. Belem, Brasil, Edições CEJUP.

Cummings, Barbara. (1990) *Dam the Rivers, Damn the People*. Earthscan Publications. London

Curt, Charles. (1993) *Uneven Development, Poverty and the Environment in Brazil*. Documento de Trabalho no.31. Instituto Sociedade, População e Natureza, Brasilia.

CVRD. (1986) *Carajás: Manganês do Azul*. CVRD Revista, VII, 24, June.

CVRD. (1987*) Estudo Impacto Ambiental e Desenvolvimento Socio-Economico ao Lango da Estrada de Ferro Carajás*. CVRD/SUMEI. Rio de Janeiro.

Dabelko, Geoffrey & David Dabelko. "Environmental Security: Issues of Conflict and Redefinition". In *Environmental Change and Security Project Report*, issue 1. The Woodrow Wilson Center Washington, DC, 1995.

Dabelko, Geoffrey & P.J Simmons. (1997) "Environment and Security: Core Ideas and US government Initiatives". *SAIS Review*, Winter- Spring 1997.

Dargie, Tom & Peter Furley. (1994) "Monitoring Change in Land Use and the Environment" In Furley, Peter (ed.) *The Forest Frontier. Settlement and Change in Brazilian Roraima*. Published by Routledge. London and New York.

Davis, Shelton. (1977) *Victims of the Miracle: Development and the Indians of Brazil.* Cambridge University Press.

Del Roso, Stephen. (1995) "The Insecure State: Reflections on the State and Security in a Changing Word". *Dœdalus* 124: 2 (April:1995).

Deudney, Daniel. (1992) "The Case Against Linking Environmental Degradation and National Security". *In Millennium*. Vol. 19, no3.

Deutsch, Karl. (1964) *The Nerves of Government*. New York. The Free Press.

Diegues, Antonio C. (1992) *The Social Dynamics of Deforestation in the Brazilian Amazon*. United Nations Research Institute for Social Development. Discussion Paper. July, 1992. Geneva, Switzerland.

Dokken, Karin. (1997) *Environment, Security and Regional Integration in West Africa*. Doctoral dissertation. Department of Political Science, University of Oslo.

Domask, Joseph. (1997) *A Holistic System Approach to International Politics and International Relation Theory: A Case Study of Brazil and Amazonia*. Doctoral Dissertation submitted to the faculty of the University of Miami in partial fulfilment of the requirements for the degree of Doctor of Philosophy in International Affairs. Coral Gables, Florida. June, 1997.

Dougherty, James & Robert Pfaltzgraff. (1990) *Contending Theories in International Relations*. Third edition. Harper Colling Publisher.

Dreifuss, René. (1998) *Strategic Perception and Frontier Policies in Brazil*. Paper presented at the conference Amazonia 2000. Development, Environment, and Geopolitics. London, June 24-26, 1998.

Dreifuss, René. (2000) "Strategic Perception and Frontier Policies in Brazil." In Hall, Anthony (ed.) *Amazonia at the Crossroads. The Challenge of Sustainable Development*. Institute of Latin America Studies. University of London.

Dyer, Hugh. (1997) "Environmental Security as a Universal Value: Implications for International Theory". In Vogler, John & Mark Imber (eds.) *The Environment and International Relations*. The Global Environmental Change Series.

Eden, Michael. (1990) *Ecology and Land Management in Amazon*. Belhaven Press. Great Britain.

Ehrlich, Paul & Anne Ehrlich. (1988) *The Environmental Dimension of National Security.* Stanford Institute for Population and Resources Studies.

Elliott, Lorraine. (1998) *The Global Politics of the Environment*. Macmillan Press.

Ernst, Haas. (1980) "Why Collaborate? Issue Linkage and International Regimes". In *World Politics* 33. (April 1980).

Estado de Sâo Paulo. March 29, 1998

Estado do São Paulo, June 4, 1998

Esteves, Antônio. (1993) *A Ocupação da Amazônia.* Editora Brasiliense, Sâo Paulo, Brasil.

Fearnside, Philip. (1983) "Development Alternatives in the Brazilian Amazon: An Ecological Evaluation". In *Interciencia*, vol. 8, no.2, 1983

Fearnside, Philip. (1984) "Brazil's Amazon Settlement Schemes". In *Habitat International*, no.8, 1984.

Fearnside, Philip. (1985) "Deforestation and Decision Making in the Development of Brazilian Amazônia" In *Interciencia*, vol.10, no.5, pp. 243-247.

Fearnside, Philip. (1986) *Human Carrying Capacity of the Brazilian Rainforest*. New York, Columbia University Press.

Fearnside, Philip. (1987) "Causes of Deforestation in the Brazilian Amazon". In Dickinson, R.F. (ed.) *The Geophysiology of Amazônia. Vegetation and Climate Interaction.* John Wiley & Sons, New York.

Fearnside, Philip. (1989) "Climate, Environment in International Security: The Case of Deforestation in the Brazilian Amazon." In *Climate and the Geo-Sciences*. Klwer Academic publishers, 1989.

Fearnside, Philip. (1990) “Environmental Destruction in the Brazilian Amazon” In Goodman, David & Anthony Hall. (eds.) *The Future of Amazonia. Destruction or Sustainable Development?* MacMillan Press.

Fearnside, Philip. (1992) *Avaliação e Identifição das Causas dos Agentes de Desmantamento.* Seminario Internacional sobre Meio Ambiente, Pobreza e Desenvolvimento da Amazônia. Belém 16 al 19 de Fevereiro. 1992, Pará.

Fearnside, Philip. (1993) “Deforestation in Brazilian Amazonia: The Effect of Population and Land Tenure” In *Ambio*, vol. 22, no. 8, December, 1993.

Fearnside, Philip. (1997) “Environmental services as a strategy for sustainable development in rural Amazonia”. In *Ecological Economics*. 20 (1), pp 321-360.

Fearnside, Philip. (1998) *Deforestation impacts, environmental services and the international community.* Paper presented at the conference Amazonia 2000. Institute of Latin American Studies, University of London, UK. 24-26 June, 1998.

FIBGE. (1980). *Anuário Estadístico do Brasil* 1979. Vol. 40 and subsequent volumes. (Fundação Instituto Brasileiro de Geografia e Estadística), Rio de Janeiro.

Finger, Mathias. (1991) “The Military, the Nation State and the Environment". In *The Ecologist*, Vol. 5, 1991.

FMATR. (1994) *O Brasil do Hemisferio Norte.* Fundação do Meio Ambiente e Tecnología de Roraima. Boa Vista. Roraima

Folha de São Paulo April 23, 1991

Folha de São Paulo. November 11, 1997

Folha de São Paulo, May 03, 2000

Forman, Shepard. (1975) *The Brazilian Peasantry*. Columbia University Press, 1975.

Foweraker, Joe. (1981) *The Struggle for Land: A Political Economy of the Pioneer Frontier in Brazil From 1930 to the Present day.* Cambridge University Press, 1981.

Foy, George & Herman Daly. (1992) “The Economic Causes of Ecological Disorder in Brazilian Amazonia: Allocation, Distribution, and Scale” In Kosinski, Leszek (ed.). *Ecological Disorder in Amazonia*: *Social Aspects.* UNESCO/ ISCS/ EDUCAM 1992. Published in Rio de Janeiro.

Freitas, Luiz. (1991) *“Politicas Públicas e Administrativas de Territórios Federais do Brasil”*. Boa Vista. Editora Boa Vista.

Furley, Peter & Luc Mougeot. (1994) “ Perspectives” In Furley, Peter (ed.) *The Forest Frontier. Settlement and Change in Brazilian Roraima*. Routledge. London and New York.

Furley, Peter ed.; (1994) *The Forest Frontier. Settlement and Change in Brazilian Roraima.* Routledge. London and New York.

Furley, Peter. (1990) "The Nature and Sustainability of Brazilian Amazon Soils". In Goodman, David & Anthony Hall (eds.) *The Future of Amazonia. Destruction or Sustainable Development?* Macmillan Press.

Gasques, Jose and Clando Yakomizo. (1986) "Resultados de 20 Anos de Incentivos Fiscais na Agropecuária da Amazônia". *Anais do 14 Encontro Nacional de Economia*. Rio de Janeiro: ANPEC, 1986.

Galtung, Johan. (1982) *Environment, Development and Military Activity: Toward Alternative Security Doctrines.* Oslo: Norwegian University Press.

Galtung, Johan. (1996) *Peace by Peaceful Means: Peace and Conflict, Development and Civilization*. London. SAGE.

Gareth, Porter & Janet Welsh. (1991) *Global Environmental Politics*. New York.

Gilpin, Robert. (1981) *War and Change in World Politics*. New York, Cambridge University Press.

Gleditsch, Nils P. (1998) "Armed Conflict and the Environment: A Critique of the Literature". In *Journal of Peace Research*, vol. 35, no.3. May 1998, pp.381-400.

Gleditsch, Nils P. ed., (1997) *Conflict and the Environment*. Dordrecht: Kluwer.

Gleditsh, Nils P. (1992) *Conversion and the Environment*. Proceeding from a Seminar in Perm, Russia, 21-27 November, 1991, PRIO Report, No. 2,1992.

Gleick, Peter. (1991) "Environment and Security: The Clear Connection" *Bulletin of Atomic Scientists*, vol. 47, no.3, pp.17-21.

Goldsmith, Edward & Nicholas Hildyard. (1984) *The Social and Environmental Effects of Large Dams.* San Francisco, Sierra Club Books.

Goldstein, Joshua. (1994) *International Relations*. Happer Collins College Publishers, New York.

Goldstone, Jack. (1992) *Imminent Political Conflicts Arising from China's Environmental Crises*. Occasional Paper Series of the Project on Environmental Change and Acute Conflict, no.2, University of Toronto.

Goodland, Robert; Watson, C. & Ledec, G. (1984) *Environmental Management in Tropical Agriculture*. Westview Press, Boulder Co.

Goodman, David and Anthony Hall. eds.; (1990) *The Future of Amazonia. Destruction or Sustainable Development?* MacMillan. Press, London.

Goreau, T. J & Mello W.Z. (1987). “Effects of Deforestation on Sources and Sinks of Atmospheric Carbon Dioxide, Nitrous Oxide, and Methane from Central Amazonian Soils and Biota During the Dry Season: A Preliminary Study”. In Athie, D; Lovejoy T, & P. de M. Oyends (eds.), Proceeding of the Workshop on *Biogeochemestry of Tropical Rainforest: Problems for Research*, Universiddad de São Paulo, Centro de Energia Nuclear na Agricultura (CENA), São Paulo: Piracicaba.

Goulding, Michael; Smith, N & D. Mahar. (1996) *Floods of Fortune: Ecology and Economy Along the Amazon*. Columbia University Press. New York.

Governo de Roraima. (1991) *Integração Fronterica. Solicitação Para Inclusão na Pauta do Encontro entre os Presidentes Fernando Collor e Carlos Andrés Péres*. Governo de Roraima, 1991.

Governo de Roraima. (1991) *Manifesto e Declaração de Principios dos Governadores de Amazônia Occidental Sobre o Desenvolvimento Auto-sustentado, Integração Continental e Abertura de Novos Mercados.* Governo de Roraima. 1991.

Governo de Roraima. (1991) *Projeto Zoneamento Ecológico-Económico de Roraima*. Governo de Roraima. Boa vista.

Graziano da Silva, J. (1980) *Estructura Agrária e Produção de Subsistência na Agricultura Brasileira*. Hucitec, São Paulo.

Gribel, Rogerio. (1989) *Balbina in the Land of Impunity.* Unpublished document.

Groppo, Paolo. (1996) *Agrarian Reform and Land Settlement Policy in Brazil-Historical Background*. Land Tenure Service, FAO Rural Development Division

Gross Stein, Janice. (1985) “Defection and Detection: Security Regimes and the Management of International Conflict”. In *International Journal* 11 (Autumn 1985).

Græger, Nina & Dan Smith eds.; (1994) *Environment, poverty, conflict*. PRIO Report no. 2 . International Peace Research Institute. Oslo.

Guardian weekly November 05, 1997

Guimarães, Roberto. (1991) *The Ecopolitics of Development in Third World*. Lynne Rienner Publishers. Boulder and London. 1991.

Guimarães, Roberto (1992) “The Institutional Dimension of the Amazonian Ecological Disorder: Bureaucracy, Diplomacy, and Ecopolitics in Brazil” In Leszek, Kosinski (ed.) *Ecological Disorder in Brazil.* UNESCO, Educam. Published in Rio de Janeiro.

Hall, Anthony. (1986) “Community Participation and Rural Development”. In James Midgley, (ed.) *Community Participation, Social Development and the State.*

Hall, Anthony. (1991) *Developing Amazonia: Deforestation and Social Conflict in Brazil’s Carajás Programme.* New York. Manchester University Press.

Hall, Anthony. (1992) *Making People Matters: Development and the Environment in the Brazilian Amazon*. Occasional Paper, No.4 University of London, Institute of Latin American studies.

Hall, Anthony. (1997) *Sustaining Amazonia. Grassroots Action for Productive Conservation*. Manchester University Press. Manchester and New York.

Hardin, Garret. (1968) "The Tragedy of the Commons" In *Bioscience*, no.162.

Harvey, Hal (1988) "Natural Security" In *Nuclear Times*. March/April 1988, pp.24-6.

Haas, Peter. (1997) "Epistemic Communities and the Dynamics of International Environmental Co-operation". In Rittberger, Volker & Peter Mayer. *Regime Theory and International Relations*. Clarendon Press. Oxford.

Hauge, Wenche & Tanja Ellingsen. (1996) *Environmental Change and Civil War: A Multivariate Approach.* Paper presented at Conflict and the Environment, NATO Advance Research Workshop, Bolkesjø. Norway. 12-16 June.

Hauge, Wenche & Tanja Ellingsen. (1998) "Beyond Environmental Scarcity: Causal Pathways to Conflict". In *Journal of Peace Research*, vol.35, no.3, pp.299-317.

Heaton, H. & Bertran, Lee. eds.; (1977) *Discovery of the Amazon According to the Accounts of Priar Gaspar de Carvajal and Others Documents.* Reprinted in 1977.

Hecht, Susana. (1985) "Environment, Development, and Politics: Capital Accumulation and the Livestock Sector in Eastern Amazonia" In *World Development*, vol. 13, pp 61-108.

Hecht, Susana & Alexander Cockburn. (1993a) *La Suerte de la Selva.* Ediciones Uniandes, Tercer Mundo Editores. Colombia, 1993.

Hecht, Susana. (1993b) "Logics of Livestock and Deforestation: The Case of Amazonia" In Boulder, Colo (ed.) *Development or Destruction: The conservation of Tropical Forest to Pasture in Latin America*. Westview Press, 1993.

Hecth, Susana; Norgaard, R & G. Possio. (1988) *The Economics of Cattle Ranching in Eastern Amazonia*. Mineo. Graduate School of Planning, UCLA, California.

Hemming, John. (1990) *Roraima: Brazil's Northernmost Frontier*. Research Paper no.20.University of London. Institute of Latin American studies.

Hirsch, Fred. (1977) *The Social Limit to Growth.* Routledge, London.

Hjort af Ornas, Anders & Mohamed Salih eds.; (1989) *Ecology and Politics: Environmental Stress and Security in Africa*. Uppsala, Scandinavian Institute of African Studies.

Hoffmann, Rodolfo. (1982 &1987) *Reforma Agraria.* Orgão de Associação Brasileira de Reforma Agrária, Vol. 12 No.6 Nov-Dez 1982 & No.2 Ag-Nov 1987.

Hoffmann, Stanley ed.; (1960) *Contemporary Theories in International Relations*. Published by Englewood Cliffs. N.J. Printice-Hall

Hoffmann, Stanley. (1961) "International Relations the Long Road to Theory". In Rosenau, James (ed.) *International Politics and Foreign Policy*. New York, the Free Press. 1961.

Holst, Johan. (1989) *Security and the Environment: A Preliminary Exploration*. Buletin of Peace Proposal, no. 29 (2), pp.123-128.

Homer-Dixon, Thomas. (1991) "On the Threshold. Environmental Change as Cause of Acute Conflict". *International Security,* vol.16, no.2. pp. 76-116.

Homer-Dixon, Thomas. (1994) "Environmental Scarcities and Violent Conflict: Evidences from the Cases". In *International Security,* vol.19, no1, summer, pp.5-40.

Homer-Dixon, Thomas. (1995) *Strategies for Studying Causation in Complex Ecological Political Systems.* Toronto. Occasional Paper for the project on Environment, Population and Security.

Homer-Dixon, Thomas. (1996) "Debate". In *Environmental Change and Security Project Report*, issue 2, pp. 49-57.

Homer-Dixon, Thomas & Valerie Percival. (1996) *Environmental Scarcity and Violent Conflict: Briefing Book*. Toronto: Project on Environment, Population and security.

Howard, Philip & Thomas Homer-Dixon. (1996) *Environmental Scarcity and Violent Conflict: The Case of Chiapas, México*. Toronto. Occasional Paper on the project on Environment, population and security.

Hurrell, Andrew. (1991) "The politics of Amazonian Deforestation". In *Journal of Latin American Studies,* no.23, pp.197-215.

Hurrell, Andrew. (1992) "Brazil and the International Politics of Environment: Actors, Interests, and Institutions" In Hurrell, Andrew & Benedict Kingsbury (eds.) *The International Politics of the Environment*. Clarendon Press, 1992.

Hurrell, Andrew. (1993) "La Política Internacional del ambiente". In Guhl, Ernesto & Juan Tokatian. (eds.) *Medio Ambiente y Relaciones Internacionales*. Tercer Mundo Editores. 1993.

Hurtman, Frederik. (1967) *The Relation of Nation*. New York.

Hveem, Helge. (1999) "Global Governance and the Comparative Political Advantage of Regional Cooperation". In Tussie, Diana. *The Environment and International Trade Negotiation*. Macmillan Press in association with International Development Research Centre.

Høgetveit, Kjetil. (1993) *System Theory, Action Theory and System Development Theory*. Master Thesis presented at the Institute of Informatics, University of Oslo, 1993.

IBASE. (1990) *Política de Desenvolvimento Regional na Amazônia: 20 anos de SUDAM.* IBASE Rio de Janeiro, Brasil.

IBDF. (1983) *Alteração da Cobertura Vegetal Natural do Territorio de Roraima*. Brasilia. Anexo Relatorio Tecnico. Ministerio de Agricultura, Brasilia.

IBGE. (1984) *Censo Agropecuário.* IBGE IX Recennseamento Geral doBrasil. Rio de Janeiro

IBGE. (1986-1992) *Anuários Estadístico.* Rio de Janeiro, IBGE.

IBGE. (1987) *Sinopsis Preliminar do Censo Agropecuário*, IBGE Rio de Janeiro

IBGE. (1988) *Mapa de Vegetação do Brasil*. Fundação O Instituto Brasileiro de Geografia e Estatistíca. Rio de Janeiro, Brasil.1988.

IBGE. (1989) *Produção da Extração Vegetal e da Silvicultura do Brasil. IBGE* Rio de Janeiro

IBGE. (1990) *Pesquisa Nacional por Amostras Domiciliares* (PNDA)- 1989. Rio de Janeiro:

IBGE. (1991) *Anuário Estatístico.* Fundação Getúlio Vargas. Rio de Janeiro.

IBGE. (1996) *Indicadores Sociais e Demográficos Mínimos*. http://www.ibge.gov.br

IBGE. (1998) http://www.ibge.gov.br

INPE. (1992) *Deforestation in Brazilian Amazonia*. National Institute for Space Research. São José dos Campos, São Paulo

INPE. (1998) http://www.inpe.br/amz-04.htm

INPE. (1998) *Instituto Nacional de Pesquisas Espaciales Actualiza os Dados do Desflorestamento na Amazônia*. INPE Noticias No.13 Jan-Feb 1998.

Jackson, María José. (1990) *Demografía e Mâo de Obra na Amazônia*. Coleção Igarape. NAEA, Belém, Pará.

Jervis, Robert. (1983) "Security Regimes" In Krasner, Stephen. *International Regimes*. Cornell University Press.

Jönsson, Christer. (1997) "Cognitive Factors in Explaining Regime Dynamics". In Rittberger, Volker & Peter Mayer. *Regime Theory and International Relations*. Clarendon Press. Oxford.

Jordan, Carl. (1985) *"Balbina: Ameaça e Destruição na Amazônia"* MAREWA. Manaus.

Journal do Brasil. March, 29, 1998

Junk, W.J and K.Furch. (1985) The Physical and Chemical Properties of Amazonian Waters Rivers. In Sioli, H.; (ed.) *The Amazon: Limnology and Landscape Ecology of a Mighty Tropical River and its Basin*. The Hague: Dr. W. Junk Publisher.

Kaplan, Morton. (1962) *System and Process in International Politics.* New York.

Kaplan, Robert. (1994). “The Coming Anarchy”. *The Atlantic Monthly*, 1994.

Kasa, Sjur. (1994) Environmental Reforms in Brazilian Amazonia under Sarney and Color-Explaining Some Contrast. In *Iberoamerican Nordic Journal of Latin American Studies*, vol. XXIV: 2, 1994.

Kelly, Kimberley & Thomas Homer-Dixon. (1996) *Environmental Scarcity and Violent Conflict: The case of Gaza*. Occasional Paper on the Project on Environment, Population and Security. Toronto.

Keohane, Robert & Joseph Nye. (1977) *Power and Interdependence: World Politics in Transition*. Little Brown, Boston

Keohane, Robert. (1984) *After Hegemony: Cooperation and Discord in World Political Economy.* Princeton NJ, Princeton University Press.

Keohane, Robert. (1995) “Hobbes’s dilemma and institutional change in world politics: Sovereignty in international society”. In Hans-Henrik H. & George Sørensen (eds.) *Whose world order?* Westview Press.1995.

Kirk, Elizabeth. (1991) “The Greening of Security: Environmental Dimensions of National, International, and Global Security After the Cold War”. In Arnett, Eric (ed.) *Science and International Security: New Perspective for a Changing World Order*. 1991.

Kolk, Ans. (1996) *Forest in International Environmental Politics*. Academisch Proefschrift. International Books, Netherlands.

Krasner, Stephen. (1983) Regimes and the limits of Realism: Regimes as Autonomous Variable. In Krasner, Stephen (ed.) *International Regimes*. Cornell University Press.

Krasner, Stephen. (1997) “Sovereignty, Regimes, and Human Rights”. In Rittberger, Volker & Peter Mayer. *Regime Theory and International Relations*. Clarendon Press. Oxford.

Krone, Robert. (1980) *System Analyses and Policy Sciences.* A Wiley-Interscience publication. United states of America.

Käkönen, Jyrki ed.; (1992) *Perspective on Environmental Conflicts and International Relations*. Pinter Publishers.

Landau, Georges. (1980) “The treaty for Amazonian Cooperation: A Bold New Instrument for Development”. In *Georgia Journal of International and Comparative Law*, vol.10, issue 3, 1980.

Lee, D. (1957) *Climate and Economic Development in the Tropics*. New York Harper & Row.

Levy, Marc. (1995) “Time for a Third Wave of Environment and Security Scholarship?” In *Environmental Change and Security Project Report*, issue 1, pp.44-46.

Levy, Marc. (1996) “Debate”. In *Environmental Change and Security Project Report*, issue 2, pp. 58-60.

Libiszewski, Stephan. (1992) *What is an Environmental Conflict?* Occasional Paper no.1. Environment and Conflict Project (ENCOP). Centre for Security Policy and Conflict Research/ Swiss Peace Foundation. Zürich/Berne

Lipschutz, Ronnie. (1997) "Environmental Conflicts and Environmental Determinism: The Relative Importance of Social and Natural Factors". In Gledisch, Niels P. (ed.) *Conflict and the Environment.* Kluwer Academic Publishers.

Lisansky, Judith. (1990) *Migrants to Amazonia: Spontaneous Colonization in the Brazilian Frontier*. Westview Press, 1990.

List Martin & Volker Rittberger. (1992) "Regime Theory and International Environmental Management". In Hurrell, Andrew & Benedict Kingsbury (eds.) *The International Politics of the Environment*. Clarendon Press. Oxford.

Lodgaard, Sverre. (1992) "Environment, Confidence-Building and Security" In Lodgaard, Sverre & Anders Örnas (eds.). *The Environment and International Security,* PRIO Report, no.3, Oslo, 1992.

Lodgaard, Sverre. (1992) "Environmental Security, World Order, and Environmental Conflict Resolution". In Gledisch, Nils P. (ed.) *Conversion and the Environment*: Proceeding of a seminar in Perm, Russia. 24-7 November 1991. PRIO-Report, No.2 May. Pp115-136.

Lonergan, Steve. (1997) "Water Resources and Conflict: Examples from the Middle East". In Gledisch, Nils P. (ed.) *Conflict and the Environment*. Dordrecht: Kluwer.

Mac Millan, Gordon. (1995) *At the End of the Rainbow? Gold, Land and People in the Brazilian Amazon*. Earthscan Publications, London.

MacMillan Gordon & Peter Furley. (1994) "Land-use Pressure and Resource Exploitation in the 1990s". In Furley, Peter. (ed.) *Forest Frontier. Settlement and Change in Brazilian Roraima*. Routledge. London and New York.

Maddison, Angus. (1992) *The Political Economy of Poverty, Equity and Growth. Brazil and Mexico*. Published for the World Bank, Oxford University Press, 1992.

Madeleine, Nina. (1993) *Land Resources and International Environmental Conflicts.* Thesis submitted for the Cand. Scient. Degree. Department of Geography. University of Oslo.

Magalães, Dorcal. (1987) *Informações Históricas*. Roraima. Terceira Edição. Boa Vista, Roraima.

Mahar, Dennis. (1979) *Frontier Development Policy in Brazil: A study of Amazonia*. Praeger Publisher. New York

Mahar, Dennis. (1989) *Government Policies and Deforestation in Brazil's Amazon Region*. Working Paper, no. 7. The World Bank. Environment Department. Washington D.C

Martins, Jose. (1975) *Capitalismo e Tradicionalismo: Estudos Sobre as Contradições da Sociedade Agraria no Brasil.* São Paulo.

Martins, José de Souza. (1992) "The State and the Militarization of the Agrarian Question in Brazil". In Schmink, Marianne & Charles Wood (eds.) *Frontier Expansion in the Amazon*. University of Florida Press.

Mathews, Jessica. (1989) "Redefining Security". *Foreign Affairs*, vol. 68, no. 2,

Matos, Marli Maria & Uhl Christopher. (1994) "Economic and Ecological Perspectives on Ranching in the Eastern Amazon". In *World Development*, vol. 22, no 2, pp.145-158

Matthew, Richard. (1995) "Environmental Security: Demystifying the Concept, Clarifying the Stakes". In *Environmental Change and Security Project Report*. Issue 1.Woodrow Wilson Center, Washington, DC, 1995.

Mayne, Alan; & Paul Newbury eds.; (1991) *Into the 21st Century. A handbook for a sustainable future.* Adamantine Press Limited, United Kingdom.

May, Peter & Eustáquio Reis. (1993) *The User Structure in Brazil's Tropical Rain Forest*. Working Paper, no. 565. Kiel Institute of World Economics.

McCleary, Rachael. (1990) *Development Strategies in Conflict: Brazil and the Future of the Amazon.* Unpublished paper. Carnegie Council on Ethics and International Affairs, 1990.

Medina, Maria Elena. (1980) "Treaty for Amazonian Cooperation: General Analysis". In Scazzocchio, Barbira (ed.). *Land People and Planning in Contemporary Amazonia*. Centre of Latin American studies. Cambridge University Press.

Mercado, Edgardo. (1984) *Análisis de los Aspectos Políticos Relacionados con el Pacto Amazónico y la Integración Latinoamericana*. Universidad Simón Bolivar, 1984.

Messias, Roberto. (1995) "Development and Management Plans for the Amazon Region: Lessons from the Past, Proposal for the Future". In Clusener- Godt, M. & I. Sachs (eds.) *Brazilian Perspectives on Sustainable Development of the Amazon Region*. Published by UNESCO, Man and the Biosphere Series. Paris 1995.San Francisco: Sierra Club Books.

Michael, Nicholson. (1992) *Rationality and the Analysis of International Conflicts.* Cambridge University Press.

Miller, James. (1978). *Living System*. Von Hoffman Press. United State of America.

MIRAD. (1985) *Plano Nacional de Reforma Agrária*. PNRA/MIRAV/INCRA. Brasilia.

MIRAD. (1986) *Conflitos de Terra*. Coordenadora de Conflitos Agrários.

MIRAD/INCRA. (1986) *Plano Regional de Reforma Agraria*. PRRA Pará. MIRAD/INCRA. Brasilia.

MIRAD. (1987) *Conflitos deTerra.* Coordenadora de Conflitos Agrários. MIRAD/INCRA. Brasilia

Mitchell C.R (1981) *The Structure of International Conflict*. Macmillan Press. London.

MST (2000) *MST en Datos*. Web site: http://www.mst.org.br

Mitsche, Patricia. (1989) “Ecological Security and the Need to Reconceptualize Security” In *Alternatives*, vol. 14, no.4.

Molvær, Reidulf. (1992) "Points for the Agenda of Studies in Environmental Security". In Logaard, Sverre & Ornös, Anders (eds.) *The Environment and International Security*, PRIO, Report, No.3, 1992. Oslo, Norway.

Monosowsky, Elizabeth. (1986) “Brazil’s Tucuruí Dam: Development at Environmental Cost”. In Goldsmith, Edward and Hildyaerd, Nicholas (eds.). *The Social and Environmental Effects of Large Dams.* vol.2: Case Studies, Wadebridge, Ecological Centre. .

Monteiro, José Marcelino. (1992) *Amazônia: Desenvolvimento ou Retroceso*. Edições Cejup. Belém, Brasil.

Moran, Emilio. (1981) *Developing the Amazon*. Indiana University Press. Bloomington.

Moran, Emilio ed.; (1983) *The Dilemma of Amazonian Development*. Westview Press. Boulder Colorado.

Moran, Emilio. (1984) “Colonization in the Transamazon and Rondônia”. In Schmink, Marianne & Wood, Charles (eds.) *Frontier Expansion in Amazonia*. University of Florida Press.

Moran, Emilio. (1989) “Government-Directed Settlement in the 1970s: An Assessment of Transamazon Highway Colonization”. In Schumann, Debra & Partridge, Willian (eds.) *The Human Ecology of Tropical Land Settlement in Latin America*. Boulder: Westview Press.

Moran, Emilio. (1993) *Trough Amazonian Eyes. The Human Ecology of Amazonian Population*. University of Iowa Press.

Mougeot, Luc & Philipe Léna. (1994) “Forest Clearance and Agriculture Strategies in Northern Roraima”. In Furley, Peter (ed.) *The Forest Frontier. Settlement and Change in Brazilian Roraima.* Routledge. New York and London.

MST. (1987) *As Assassinatos no Campo: Crime e Impunidade*. *1964-86*. Global Editora, São Paulo.

MST. (1988) *Construindo o Caminho.* Movimento dos Trabalhadores Rurais Sem Terra. São Paulo.

Muller, Charles. (1987) *Evaluçâo Recente da Agropecuária Brasileira Segundo as Dados dos Censos Agropecuarios. Análise dos Dados dos Censos Agropecuários de 1985*. IPEA Brasilia.

Neaera, Rebeca & Alberto Lourenco. (1992) “Gold, Geopolitics and Hyperurbanization in the Brazilian Amazon: The Case of Boa Vista, Roraima”. In Fadda, Giulitta (ed.) *La Urbe Latinoamericana Ante el Nuevo Milenio*. Caracas, Fondo Editorial Acta Científica Venezolana.

Neaera, Rebeca. (1992) *Urbanization and City-Ward Migration on a Resource Frontier: The Amazon Gold Rush and the Case of Boa Vista, Roraima*. Thesis submitted in partial satisfaction of the requirements for the degree Master of Arts in Urban Planning. University of California, Los Angeles.

Nicholson, Michael. (1992) *Rationality and the Analysis of International Conflicts*". Cambridge University Press.

O Globo. April 20, 1996. Rio de Janeiro, Brasil.

O Globo. December 20, 1997. Rio de Janeiro, Brasil.

O Globo March 16, 1998. Rio de Janeiro, Brasil.

O Globo. March 10, 1998. Rio de Janeiro, Brasil.

O Globo. May 03, 1998. Rio de Janeiro, Brasil.

O Liberal. June 21, 1987. Belém, Pará.

O Liberal. April 1, 1998. Belem, Pará.

O Liberal. April 04, 1998. Belém do Pará.

O Liberal. May 31, 1998. Belém do Pará.

O Liberal. November 10, 1998. Belém do Pará.

O.E.A (1993) *Binational Programs for Border Cooperation.* O.E.A Washington, D.C., 1993.

O'Donnell, Guillermo. (1973) *Modernization and Authoritarianism*. Berkeley. University of California. Institute for International Studies.

O'Donnell, Guillermo. (1978) "Reflection of the Patterns of Changes in the Bureaucratic-Authoritarian State". In *Latin American Research Review,* vol. 13, no.1

Ostrom, Elinor. (1990). Governing the Commons: the Evolution of Institutions for Collective Action. In E. James Alt & Douglas C. (eds). *The Political Economy of Institutions and Decisions*. Cambridge: Cambridge University Press.

Ozorio, Ana Luíza & João S. Campari. (1995) *Sustainable settlement in the Brazilian Amazon.* Oxford University Press.

Pearce, David & Norman Myers**.** (1990) " Economic Values and the Environment of Amazonia" In Goodman, David and Anthony Hall (eds.), *The Future of Amazonia. Destruction or Sustainable Development?* London Macmillan.

Pearce, David; Barbier, Edward & Anil Markandya. (1991) *Sustainable Development: Economic and Environment in the Third World*. Earthscan Publications LTD., London.

Percival, Valerie & Thomas Homer-Dixon. (1995*) Environmental Scarcity and Violent Conflict: The Case of South Africa*. Occasional Paper. Project on Environment, Population, and Security. Toronto

Pfeiffer, W.; and L. D de Lacerda. (1988) *Mercury Inputs into the Amazon Region, Brazil.* Environmental Technology Letters 9: 325-330.

Pinheiro, Brasil. (1976) "Raízes do Brasil. Una Re-Leitura" In *Revista do Centro de Estudos Brasileiros*, Curitiba Dezembre p.69-193.

Pinto, Lúcio Flavio. (1986) *Amazônia: No Rastro do Saque*. São Paulo. Hucitec.

Pinto, Lucio. (1986) *Calha Norte: O Projeto Especial para Ocupação das Fronteira*. CECI, Mineo, 1986.

Poelhekke, Fabio. (1986) "Fences in the Jungle. Cattle Raising and the Economic and Social Integration of the Amazon Region in Brazil". In *Revista Geográfica*, no.104 Julio- Diciembre 1986, pp.33-43. Instituto Panamericano de Geografía e Historia.

Pompermayer, R. (1984) "Strategies of Private Capital in the Brazilian Amazon". In Schmink, Marianne & Wood, Charles (eds.) *Frontier Expulsion in Amazonia*. Gainesville, University of Florida.

Porantin Newspaper: December 1996, p.7

Prins, Gwyn. (1993) *Threats Without Enemies: Facing Environmental Insecurity.* The global security programme. Earthscan publications LTD.

Ragin, Charles. (1987) "*The Comparative Method. Moving Beyond Qualitative and Quantitative Strategies*". University of California Press.

Rapoport, Anatol. (1968) *General System Theory. Essential Concepts and Applications*. ABACUS press. UK

Rapoport, Anatol. (1974) *Conflict in Man Made Environment*. Penguin books Ltd. England.

Ray, James. (1995) *Democracy and International Conflict: An Evaluation of the Democratic Peace Proposition*. Columbia. University of South Caroline Press.

Renner, Michael. (1989) *National Security: The Economic and Environmental Dimensions*. Worldwatch Paper, May 1989.

Renner, Michael. (1996) *Fighting for Survival*. The Worldwatch Environmental series.

Repetto, R. (1987) "Creating Incentives for Sustainable Forest Development". In *Ambio* 16 (2-3): 94-9.

Rex, John. (1981) *Social conflict. A Conceptual and Theoretical Analyses*. Longman Group.

Riviére, Peter. (1972) *"The Forgotten Frontier. Ranchers of North Brazil"*. Cambridge University

Roett, Riordan. (1992) *Brazil: Politics in a Patrimonial Society.* Fourth edition. Praeger

Rogers, Katrina. (1997) " Pre-emting Violent Conflict: Learning from Environmental Cooperation. In Gledisch, Niels P. (ed.) *Conflict and the Environment*. Kluwer Academic Publishers.

Romm, Joseph. (1993) *Defining National Security: The Non-military Aspects.* New York: Council of Foreign Relations Press, 1993.

Rosenau, James. (1984) "A Pre-theory Revisited: World Politics in an Era of Cascading Interdependence". In *International Studies Quarterly*, vol. 28, no.3. September, 1984.

Rowlands, Ian. (1991) "The Security Challenges of Global Environmental Change" *The Washington Quarterly*. Winter, 1991.

Royal Norwegian Ministry of Defence. (1986) *Security and the Environment: Exploring Some Key Issues of Our Times*. Oslo, Norway, October 1986.

SAE. (1997) *Cenários Exploratórios do Brasil 2020.* Texto para Discussão. Brasília: Secretaría de Asuntos Estratégicos. September, 1997.

Sánchez, Pedro. (1982) "Amazon Basin Soils: Management for Continuos Crop Production". In *Science* 216: 821-827

Santilli, Marcio. (1989) The Calha Norte Project: Military Guardianship and Frontier Policy. In *Cultural Survival Quarterly*, vol.13, no.1, 1989.

Santos, Roberto. (1984) Law and Social Change: The Problem of Land in the Brazilian Amazon. In Schmink, Marianne & Charles Wood (eds.) *Frontier Expansion in the Amazon.* University of Florida Press.

Santos, Roberto. (1989) O Genius de una Economia: Reflexões e Propostas Sobre o Desenvolvimento da Amazônia. In *Populações Humanas e Desenvolvimento Amazônico*. Serie cooperação Amazônica. Universidad Federal do Pará. Belém.

Sawyer, Donald. (1984) Frontier Expansion and Retraction in Brazil. In Schmink, Marianne & Charles Wood (eds.) *Frontier Expansion in Amazonia*. University of Florida Press.

Schneider, Robert. (1992) *Brazil: An analysis of Environmental Problems in the Amazon*. Report no. 9104- Br World Bank, Washington DC.

Schneider, Robert. (1995) *Government and the Economy on the Amazon Frontier*. World Bank Environmental paper no.11. Washington, D.C.

Schmink, Marianne & Charles Wood eds.; (1984) *Frontier Expansion in Amazonia* University of Florida Press.

Schmink, Marianne & Charles Wood. (1992) *Contested Frontier in Amazonia.* Columbia University Press. New York.

Schwarde, Egydio. (1987) *Calha Norte. Waimiri-Atroari: Uma Experiencia Ilustrativa.* Unpublished document.

Schönemberg, Regina. (1994) *Environmental Conflicts in the Amazon Region of Brazil.* Unpublished paper. Belém, Pará.

Scott, John. (1995) *Small States and Security Regimes. The International Politics of Nuclear non-Proliferation in Nordic Europe and the South Pacific*. University Press.

Secretario Geral do Conselho de Segurança Nacional. *Projeto Calha Norte.* "Exposição de Motivos # 018\85 de 19 de Junho de 1985.

SEJUP. (1993) Serviço Brasileiro de Justiça e Paz. *News from Brazil*, No.102, October 28, 1993.

SEJUP. (1995) Serviço Brasileiro de Justiça e Paz. *News from Brazil*, No. 165, February 09, 1995.

SEJUP. (1997). Serviço Brasileiro de Justiça e Paz. *Newsletter* 284. August 21, 19997.

SEJUP. (1997) Serviço Brasileiro de Justiça e Paz. *Newsletter* 293, November 20, 1997.

SEJUP. (1997) Serviço Brasileiro de Justica e Paz. *News from Brazil*, No. 279, July 10, 1997.

SEJUP. 1998. Serviço Brasileiro de Justiça e Paz. *Newsletter* 303, February 09, 1998

SEJUP. (2000) Serviço Brasileiro de Justiça e Paz. *News from Brazil*, No.302, May, 04, 2000.

SEPLAN. (1991) *Programa Especial de Investimentos 1991-95.* Secretaria de Planejamento, Industria e Comercio, Boa Vista. Roraima

Serviço Brasileiro de Justiça e Paz. Web site. http://www.oneworld.one/sejup

Shuman, Michael & Hal Harvey. (1994) *Security Without War: A Post-cold War Foreign Policy*. Boulder Westview Press.

Silva, María. (1994) *A Mineração no Pará: Elementos para una Estrategia de Desenvolvimento Regional*. Governo do estado do Pará.

Silveira, Semida. (1994) *Transformation in Amazonia. The Spatial Reconfiguration of System.* Kugl. Tecknisca Högskolan, Stockolm.

Skole, David & Compton Tucker. *Tropical Deforestation and Habitat Fragmentation in the Amazon: Satellite data from 1978 to 1988*. http://pathfinder-www.sr.unh.edu

Smith, Dan & Willy Østreng eds.; (1997) *Research on Environment, Poverty and Conflict. A Proposal.* International Peace Research Institute, Oslo. PRIO.

Smith, Nigel. (1979) *A Pesca no Rio Amazonas*. Manaus. Instituto Nacional do Pesquisas da Amazônia. Manaus

Smith, Nigel. (1982) *Rainforest Corridors: The Transamazon Colonization Scheme.* Berkeley, University of California Press.

Smith, Nigel; Serrão, Emanuel.; Alvim, Paulo & Falesi Italo. (1995) *Amazonia: Resiliency and Dynamism of the Land and its People.* United Nations University Press. 1995.

Stephen, Haggard & Beth Simmons. (1987) "Theories of International Regimes". In *International Organization* 41. (Summer 1987).

Stern, Erick. (1995) "Bringing the Environment in: The Case for Comprehensive Security". In *Cooperation and Conflict,* vol.30, pp. 211-237.

Stern, Paul. & Thomas Dietz. (1994) "The Values of Environmental Concern" In *Journal of Social Issues,* vol. 50, no.3, 1994.

SUDAM. (1984) *Divisão Estatística. Amazonia Legal. Area População Residente Censitaria in 1970, 1980 e Projectada para Periódo 1981-1990*. Belém, Brasil.

SUPLAN. (1980) *Apitão Agrícola das Terras de Roraima*. Secretaria Nacional de Planejamiento Agrícola. Ministerio de Agricultura. Brasilia.

Susser, Bernard. (1992). *Approaches to the Study of Politics*. MacMillan. London.

Swain, Ashok. (1993) *Environment and Conflict: Analysing the Developing World*. Report No.37 Department of Peace and Conflict Research. Uppsala University, Sweden.

Tennberg, Monica. (1995) "Risky Business: Defining the Concept of Environmental Security". In *Cooperation and Conflict*, vol. 30, pp. 239-58.

Thomas, Caroline. (1992) *The Environment and International Relations*. The Royal Institute of International Affairs, London.

Thompson, Michael (1997) *The New World Disorder: Is Environmental Security the Cure?* LOS-Senter Notat 9719. Bergen.

Tolosa, Hamilton. (1991) "Pobreza no Brasil: Una Avaliação dos Anos 80" In Velloso, João Paulo, (ed.) *A Questão Social no Brasil.* São Paulo: Nobel.

Toniolo, Angelica & Uhl Christopher. (1995) Economic and Ecological Perspectives on Agriculture in the Eastern Amazon. In *World Development*, vol. 23, no.6, pp. 959-973.

Treece, David. (1987) *Bound in Misery and Iron. The Impact of the Greater Carajás Program on the Indians of Brazil*. Survival International London.

Trolldalen, Jon Martin. (1992) *International Environmental Conflict Resolution. The Role of the United Nations*. WFED; UNTAR; NIDR. World Foundation for Environment and Development.

Tussie, Diana. (1999) *The Environment and International Trade Negotiation*. Macmillan Press in association with International Development Research Centre.

Ullman, Richard. (1983) "Redefining security". In *International Security,* vol. 8. 1983.

Ulrich, Rita. (1989) *Environment and security in the horn of Africa*. Report Prepared for the United Nation Environment Programme Peace, Security and the Environment Programme Regional Cooperation in the horn of Africa.

Velho, Octavio. (1976) *Capiatalismo e Campesinato.* São Paulo. Brasil

Vessani, Luiz. (1987) *Xiriana, Indios que Garimpam. Relatório de Pesquisa na Área Yanomani*. Universidad Federal de Goiás.

Viola, Eduardo. (2000) *The Global Politics of Climate Change: How Strong are the Forces Supporting Sustainability?* Paper presented at the 10th World Congress of Rural Sociology. Rio de Janeiro, Brazil, 30 July to 5 August 2000

Viveros de Castro, Eduardo & M, Lucia. (1988) Hidrelétricas do Xingú: O estado contra a sociedades Indíginas. In Leinal, A. Santos & Lucia de Andrade (eds.) *As Hidreléctricas do Xingú e os Povos Indiginas*. São Paulo, Comissão pro-Indio.

Wagner, Alfredo. (1993) *A Questão da Terra na Amazônia*. CNDDA. Publicação no.19. Rio de Janeiro.

Walt, Stephen. (1991) “The Renaissance of Security Studies”. In *International Studies Quarterly,* vol.35, pp. 211-39.

Weistein, Barbara. (1983) *The Amazon Rubber Boom, 1850-1920*. Stanford University Press.

Westing, Arthur ed., (1986). *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*. Oxford University Press.

Westing, Arthur. (1990) *Comprehensive Security for the Baltic: An Environmental Approach*", SAGE publications, London.

Wood, Charles & Schmink, Marianne. (1993) “The Military and the Environment in the Brazilian Amazon”. In *Journal of Political and Military Sociology,* vol. 21 (Summer) pp 81-105.

Wood, Charles. (1983) “Peasant and Capitalist Production in the Brazilian Amazon: A conceptual Study for the Study of Frontier Expansion. In Emilio Moran (ed.) *The Dilemma of Amazonian Development*. Westview Press. Boulder, Colorado.

Yin, Robert. (1989) *Case Study Research. Design and Method*. SAGE Publications. London, England.

Young, Oran; Demko, Geroge, and Kilaparti Ramakrishna eds.; (1996) *Global Environmental Change and International Governance*. The Nelson A. Rockefeller series. University Press of New England. Hanover and London.

Young, Oran. (1994) *International Governance: Protecting the Environment in a stateless Society.* Cornell Studies in Political Economy, ed. Peter J. Katzensteins. Ithaca & London: Cornell University Press.

Zimmermann J ed., (1973) *"Diagnóstico Socio Económico Preliminar"*. Boa Vista. ACAR (Associação de Crédito e Assistencia Rural-Roraima).